OM-405 184 289AE
April 2004

Processes

Stick (SMAW) Welding

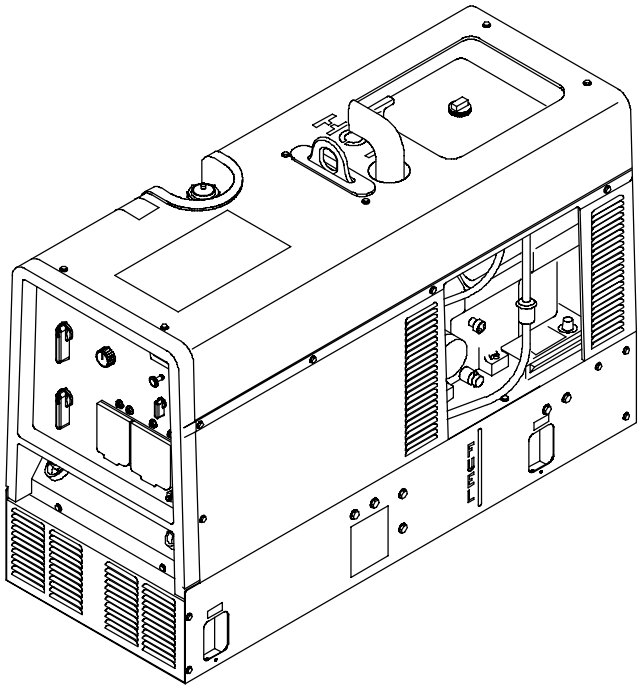
MIG (GMAW) Welding
Flux Cored (FCAW) Welding

Non-Critical TIG (GTAW) Welding

Description

Engine Driven Welding Generator

Bobcat™ 225 NT



OWNER'S MANUAL

Visit our website at
www.MillerWelds.com

From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

ISO 9001:2000 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001:2000 Quality System Standard.

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TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

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SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING

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▲ **Warning: Protect yourself and others from injury — read and follow these precautions.**

1-1. Symbol Usage

Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-7. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground — check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring — replace cord immediately if damaged — bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists in inverters after stopping engine.

- Stop engine on inverter and discharge input capacitors according to instructions in Maintenance Section before touching any parts.

FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.

ARC RAYS can burn eyes and skin.

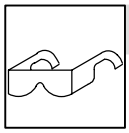
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.

WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

HOT PARTS can cause severe burns.

- Allow cooling period before maintaining.
- Wear protective gloves and clothing when working on a hot engine.
- Do not touch hot engine parts or just-welded parts bare-handed.

NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.

CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder — explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

1-3. Engine Hazards

BATTERY EXPLOSION can BLIND.

- Always wear a face shield, rubber gloves, and protective clothing when working on a battery.
- Stop engine before disconnecting or connecting battery cables or servicing battery.
- Do not allow tools to cause sparks when working on a battery.
- Do not use welder to charge batteries or jump start vehicles.
- Observe correct polarity (+ and –) on batteries.
- Disconnect negative (–) cable first and connect it last.

FUEL can cause fire or explosion.

- Stop engine and let it cool off before checking or adding fuel.
- Do not add fuel while smoking or if unit is near any sparks or open flames.
- Do not overfill tank — allow room for fuel to expand.
- Do not spill fuel. If fuel is spilled, clean up before starting engine.
- Dispose of rags in a fireproof container.
- Always keep nozzle in contact with tank when fueling.

MOVING PARTS can cause injury.

- Keep away from fans, belts, and rotors.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Stop engine before installing or connecting unit.
- Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
- To prevent accidental starting during servicing, disconnect negative (–) battery cable from battery.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall panels or guards and close doors when servicing is finished and before starting engine.
- Before working on generator, remove spark plugs or injectors to keep engine from kicking back or starting.
- Block flywheel so that it will not turn while working on generator components.

STEAM AND HOT COOLANT can burn.

- If possible, check coolant level when engine is cold to avoid scalding.
- Always check coolant level at overflow tank, if present on unit, instead of radiator (unless told otherwise in maintenance section or engine manual).
- If the engine is warm, checking is needed, and there is no overflow tank, follow the next two statements.
- Wear safety glasses and gloves and put a rag over radiator cap.
- Turn cap slightly and let pressure escape slowly before completely removing cap.

ENGINE EXHAUST GASES can kill.

- Use equipment outside in open, well-ventilated areas.
- If used in a closed area, vent engine exhaust outside and away from any building air intakes.

BATTERY ACID can BURN SKIN and EYES.

- Do not tip battery.
- Replace damaged battery.
- Flush eyes and skin immediately with water.

ENGINE HEAT can cause fire.

- Do not locate unit on, over, or near combustible surfaces or flammables.
- Keep exhaust and exhaust pipes way from flammables.

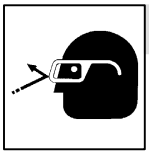
EXHAUST SPARKS can cause fire.

- Do not let engine exhaust sparks cause fire.
- Use approved engine exhaust spark arrestor in required areas — see applicable codes.

1-4. Compressed Air Hazards

BREATHING COMPRESSED AIR can cause serious injury or death.

- Do not use compressed air for breathing.
- Use only for cutting, gouging, and tools.



COMPRESSED AIR can cause injury.

- Wear approved safety goggles.
- Do not direct air stream toward self or others.

TRAPPED AIR PRESSURE AND WHIPPING HOSES can cause injury.

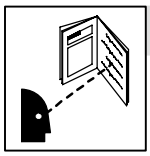
- Release air pressure from tools and system before servicing, adding or changing attachments, or opening compressor oil drain or oil fill cap.

HOT METAL from air arc cutting and gouging can cause fire or explosion.

- Do not cut or gouge near flammables.
- Watch for fire; keep extinguisher nearby.

HOT PARTS can cause burns and injury.

- Do not touch hot compressor or air system parts.
- Let system cool down before touching or servicing.



READ INSTRUCTIONS.

- Read Owner's Manual before using or servicing unit.
- Stop engine and release air pressure before servicing.

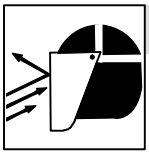
1-5. Additional Symbols For Installation, Operation, And Maintenance

FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, trailer, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.

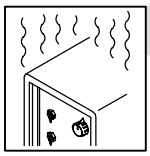
OVERHEATING can damage motors.

- Turn off or unplug equipment before starting or stopping engine.
- Do not let low voltage and frequency caused by low engine speed damage electric motors.
- Do not connect 50 or 60 Hertz motors to the 100 Hertz receptacle where applicable.



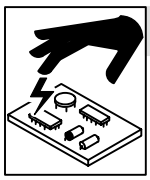
FLYING SPARKS can cause injury.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.



OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.

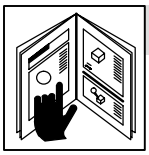


STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

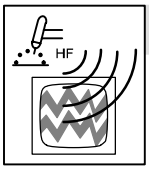
TILTING OF TRAILER can cause injury.

- Use tongue jack or blocks to support weight.
- Properly install welding generator onto trailer according to instructions supplied with trailer.



READ INSTRUCTIONS.

- Use only genuine MILLER/Hobart replacement parts.
- Perform engine and air compressor (if applicable) maintenance and service according to this manual and the engine/air compressor (if applicable) manuals.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.

ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as microprocessors, computers, and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-6. California Proposition 65 Warnings

▲ **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

▲ **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

For Gasoline Engines:

▲ **Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

For Diesel Engines:

▲ **Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

1-7. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126 (phone: 305-443-9353, website: www.aws.org).

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126 (phone: 305-443-9353, website: www.aws.org).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org and www.sparky.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1735 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102 (phone: 703-412-0900, website: www.cganet.com).

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3 (phone: 800-463-6727 or in Toronto 416-747-4044, website: www.csa-international.org).

Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 11 West 42nd Street, New York, NY 10036–8002 (phone: 212-642-4900, website: www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org and www. sparky.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (there are 10 Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

1-8. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

▲ Avertissement: Protégez vous et les autres des blessures – lisez et suivez ces précautions.

2-1. Signification des symboles

Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ Identifie un message de sécurité particulier.

☞ *Signifie NOTA ; n'est pas relatif à la sécurité.*

Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

2-2. Dangers relatifs au soudage à l'arc

▲ Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 2-6 . Veuillez lire et respecter toutes ces normes de sécurité.

▲ L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.

▲ Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.

UN CHOC ÉLECTRIQUE peut tuer.

Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d'entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique àcourant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique àcourant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique àcourant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- Des précautions de sécurité supplémentaires sont requises dans des environnements à risque comme: les endroits humides ou lorsque l'on porte des vêtements mouillés; sur des structures métalliques au sol, grillages et échafaudages; dans des positions assises, à genoux et allongées; ou quand il y a un risque important de contact accidentel avec la pièce ou le sol. Dans ces cas utiliser les appareils suivants dans l'ordre de préférence: 1) un poste à souder DC semi–automatique de type CV (MIG/MAG), 2) un poste à souder manuel (électrode enrobée) DC, 3) un poste à souder manuel AC avec tension à vide réduite. Dans la plupart des cas, un poste courant continu de type CV est recommandé. Et, ne pas travailler seul!
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la terre du cordon d'alimentation – Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé – remplacer le cordon immédiatement s'il est endommagé – un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct – ne pas utiliser le connecteur de pièce ou le câble de retour.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

Une tension DC importante subsiste à l'intérieur des onduleurs après avoir coupé l'alimentation.

- Couper l'alimentation du poste et décharger les condensateurs d'entrée comme indiqué dans la Section Maintenance avant de toucher des composants.

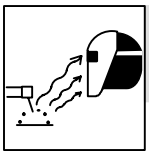
LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l'interieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et si nécessaire, en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.

LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

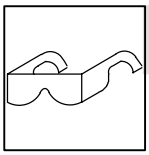
Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- Porter un casque de soudage muni d'un écran de filtre approprié pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.
- Utiliser des écrans ou des barrières pour protéger des tiers de l'éclair et de l'éblouissement; demander aux autres personnes de ne pas regarder l'arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (laine ou cuir) et une protection des pieds.

LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.
- Suivre les recommandations dans OSHA 1910.252(a)(2)(iv) et NFPA 51B pour les travaux à chaud et avoir de la surveillance et un extincteur à proximité.



DES PARTICULES VOLANTES peuvent blesser les yeux.

- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.

DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Prévoir une période de refroidissement avant d'effectuer des travaux d'entretien.
- Porter des gants et des vêtements de protection pour travailler sur un moteur chaud.
- Ne pas toucher à mains nues les parties chaudes du moteur ni les pièces récemment soudées.

LE BRUIT peut affecter l'ouïe.

Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.

LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.

Si des BOUTEILLES sont endommagées, elles pourront exploser.

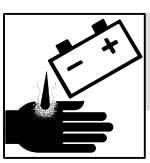
Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publication P-1 CGA énumérées dans les normes de sécurité.

2-3. Dangers existant en relation avec le moteur

LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



L'ACIDE DE LA BATTERIE peut provoquer des brûlures dans les YEUX et sur la PEAU.

- Ne pas renverser la batterie.
- Remplacer une batterie endommagée.
- Rincer immédiatement les yeux et la peau à l'eau.

L'EXPLOSION DE LA BATTERIE peut RENDRE AVEUGLE.

- Toujours porter une protection faciale, des gants en caoutchouc et vêtements de protection lors d'une intervention sur la batterie.
- Arrêter le moteur avant de débrancher ou de brancher les câbles de batterie.
- Eviter de provoquer des étincelles avec les outils en travaillant sur la batterie.
- Ne pas utiliser le poste de soudage pour charger les batteries ou des véhicules de démarrage rapide.
- Observer la polarité correcte (+ et –) sur les batteries.
- Débrancher le câble négatif (–) en premier lieu. Le rebrancher en dernier lieu.

LE CARBURANT MOTEUR peut provoquer un incendie ou une explosion.

- Arrêter le moteur avant de vérifier le niveau de carburant ou de faire le plein.
- Ne pas faire le plein en fumant ou proche d'une source d'étincelles ou d'une flamme nue.
- Ne pas faire le plein de carburant à ras bord; prévoir de l'espace pour son expansion.
- Faire attention de ne pas renverser de carburant. Nettoyer tout carburant renversé avant de faire démarrer le moteur.
- Jeter les chiffons dans un récipient ignifuge.

DES ORGANES MOBILES peuvent provoquer des blessures.

- Ne pas approcher les mains des ventilateurs, courroies et autres pièces en mouvement.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.
- Arrêter le moteur avant d'installer ou brancher l'appareil.
- Demander seulement à un personnel qualifié d'enlever les dispositifs de sécurité ou les recouvrements pour effectuer, s'il y a lieu, des travaux d'entretien et de dépannage.
- Pour empêcher tout démarrage accidentel pendant les travaux d'entretien, débrancher le câble négatif (–) de batterie de la borne.
- Ne pas approcher les mains, cheveux, vêtements lâches et outils des organes mobiles.
- Remettre en place les panneaux ou les dipositifs de protection et fermer les portes à la fin des travaux d'entretien et avant de faire démarrer le moteur.
- Avant d'intervenir, déposer les bougies ou injecteurs pour éviter la mise en route accidentelle du moteur.
- Bloquer le volant moteur pour éviter sa rotation lors d'une intervention sur le générateur.

LA VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT CHAUD peuvent provoquer des brûlures.

- Il est préférable de vérifier le liquide de refroidissement une fois le moteur refroidi pour éviter de se brûler.
- Toujours vérifier le niveau de liquide de refroidissement dans le vase d'expansion (si présent), et non dans le radiateur (sauf si précisé autrement dans la section maintenance du manuel du moteur).
- Si le moteur est chaud et que le liquide doit être vérifié, opérer comme suivant :
- Mettre des lunettes de sécurité et des gants, placer un torchon sur le bouchon du radiateur.
- Dévisser le bouchon légèrement et laisser la vapeur s'échapper avant d'enlever le bouchon.

LA CHALEUR DU MOTEUR peut provoquer un incendie.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Tenir à distance les produits inflammables de l'échappement.

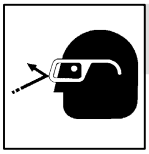
LES ÉTINCELLES À L'ÉCHAPPEMENT peuvent provoquer un incendie.

- Empêcher les étincelles d'échappement du moteur de provoquer un incendie.
- Utiliser uniquement un pare-étincelles approuvé – voir codes en vigueur.

2-4. Dangers liés à l'air comprimé

RESPIRER L'AIR COMPRIMÉ peut provoquer des blessures graves ou causer la mort.

- Ne pas utiliser l'air comprimé pour respirer.
- Utiliser l'air comprimé seulement pour le coupage, gougeage et les outils pneumatiques.



L'AIR COMPRIMÉ peut provoquer des blessures.

- Porter des lunettes de sécurité approuvées.
- Ne pas diriger le jet d'air vers d'autres ou soi–même.

L'AIR COMPRIME EMMAGASINE ET DES TUYAUX SOUS PRESSION peuvent provoquer des blessures.

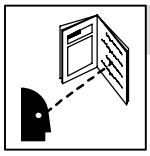
- Relâcher la pression d'air de l'outillage ou du système avant d'effectuer la maintenance, avant de changer ou de rajouter des éléments ou avant d'ouvrir la purge ou le bouchon de remplissage d'huile.

Le METAL CHAUD lors du coupage et gougeage plasma peut provoquer un incendie ou une explosion.

- Ne pas couper ou gouger à proximité de produits inflammables.
- Surveillez et garder un extincteur à proximité.

DES PIECES CHAUDES peuvent provoquer des brûlures et blessures.

- Ne pas toucher le compresseur ou d'autres éléments du circuit air comprimé chauds.
- Laisser l'ensemble se refroidir avant de toucher ou d'effectuer la maintenance.



LIRE LES INSTRUCTIONS.

- Lisez le manuel d'instructions avant l'utilisation ou la maintenance de l'appareil.
- Arrêter le moteur et relâcher la pression avant d'effectuer la maintenance.

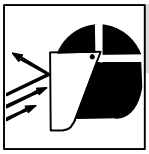
2-5. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil lui-même ; sans chariot, de bouteilles de gaz, remorque, ou autres accessoires.
- Utiliser un équipement de levage de capacité suffisante pour lever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.

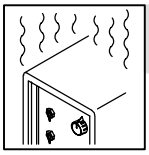
LE SURCHAUFFEMENT peut endommager le moteur électrique.

- Arrêter ou déconnecter l'équipement avant de démarrer ou d'arrêter le moteur.
- Ne pas laisser tourner le moteur trop lentement sous risque d'endommager le moteur électrique à cause d'une tension et d'une fréquence trop faibles.
- Ne pas brancher de moteur de 50 ou de 60 Hz à la prise de 100 Hz, s'il y a lieu.



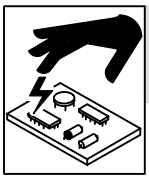
LES ÉTINCELLES VOLANTES risquent de provoquer des blessures.

- Porter un écran facial pour protéger le visage et les yeux.
- Affuterr l'électrode au tungstène uniquement à la meuleuse dotée de protecteurs. Cette manoeuvre est à exécuter dans un endroit sûr lorsque l'on porte l'équipement homologué de protection du visage, des mains et du corps.
- Les étincelles risquent de causer un incendie – éloigner toute substance inflammable.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Laisser l'équipement refroidir ; respecter le facteur de marche nominal.
- Réduire le courant ou le facteur de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d'air du poste.

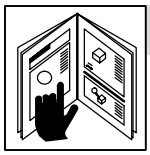


LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimes.

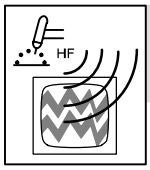
UNE REMORQUE QUI BASCULE peut entraîner des blessures.

- Utiliser les supports de la remorque ou des blocs pour soutenir le poids.
- Installer convenablement le poste sur la remorque comme indiqué dans le manuel s'y rapportant.



LIRE LES INSTRUCTIONS.

- Utiliser seulement les pièces de rechange d'origine.
- Effectuer la maintenance du moteur et du compresseur (si applicable) suivant ce manuel et le manuel du moteur/compresseur (si applicable).



LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute fréquence (H.F.) peut provoquer des interférences avec les équipements de radio–navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et et un blindage pour réduire les interférences éventuelles.

LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

2-6. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, norme ANSI Z49.1, de l'American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126 (téléphone : (305) 443–9353, site Web : www.aws.org).
Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping, norme American Welding Society AWS F4.1, de l'American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126 (téléphone : (305) 443–9353, site Web : www.aws.org).
National Electrical Code, norme NFPA 70, de la National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269–9101 (téléphone : (617) 770–3000, sites Web : www.nfpa.org et www.sparky.org).
Safe Handling of Compressed Gases in Cylinders, brochure CGA P–1, de la Compressed Gas Association, 1735 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202–4102 (téléphone : (703) 412–0900, site Web : www.cganet.com).
Code for Safety in Welding and Cutting, norme CSA W117.2, de la Canadian Standards Association, Standards Sales, 178 boulevard Rexdale, Rexdale (Ontario) Canada M9W 1R3 (téléphone : (800) 463–6727 ou à Toronto : (416) 747–4044, site Web : www.csa–international.org).
Practice For Occupational And Educational Eye And Face Protection, norme ANSI Z87.1, de l'American National Standards Institute, 11 West 42nd Street, New York, NY 10036–8002 (téléphone : (212) 642–4900, site Web : www.ansi.org).
Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, norme NFPA 51B, de la National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269–9101 (téléphone : (617) 770–3000, site Web : www.nfpa.org et www.sparky.org).
OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, de l'U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (il y a 10 bureaux régionaux – Téléphone pour la Région 5, Chicago : (312) 353–2220, site Web : www.osha.gov).

2-7. Information sur les champs électromagnétiques

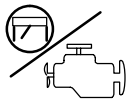
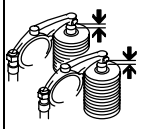
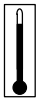
Données sur le soudage électrique et les effets des champs magnétiques basse fréquence sur l'organisme
En parcourant les câbles de soudage, le courant crée des champs électromagnétiques. Les effets potentiels de tels champs restent préoccupants. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité de spécialistes du National Research Council a conclu : « L'accumulation de preuves n'a pas démontré que l'exposition aux champs magnétiques et aux champs électriques à haute fréquence constitue un risque pour la santé humaine ». Toutefois, les études et l'examen des preuves se poursuivent. En attendant les conclusions finales de la recherche, il serait souhaitable de réduire l'exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques en milieu de travail, respecter les consignes suivantes :
1. Garder les câbles ensemble en les torsadant ou en les fixant avec du ruban adhésif.
2. Mettre tous les câbles du côté opposé à l'opérateur.
3. Ne pas s'enrouler les câbles autour du corps.
4. Garder le poste de soudage et les câbles le plus loin possible de soi.
5. Placer la pince de masse le plus près possible de la zone de soudage.

Consignes relatives aux stimulateurs cardiaques :
Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur médecin. Si ce dernier les déclare aptes, il leur est recommandé de respecter les consignes ci-dessus.

SECTION 3 – DEFINITIONS

3-1. Symbol Definitions

Stop Engine	Fast (Run, Weld/Power)	Fast/Slow (Run/Idle)	Slow (Idle)
Start Engine	Read Operator's Manual	A Amperes	V Volts
Engine Oil	Fuel	Battery (Engine)	 Engine
Engine Choke	 Check Valve Clearance	Do not switch while welding	Work Connection
Positive	Negative	Alternating Current (AC)	Output
Welding Arc (Electrode)	MIG (GMAW), Wire	Stick (SMAW)	TIG (GTAW)
h Hours	s Seconds	Time	Protective Earth (Ground)
Circuit Breaker	 Temperature		

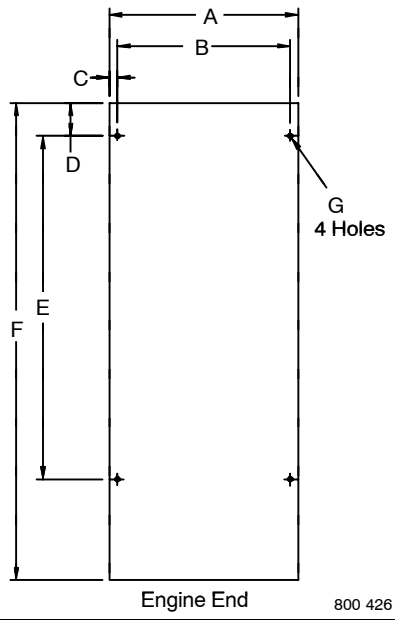
SECTION 4 – SPECIFICATIONS

4-1. Weld, Power, and Engine Specifications

Welding Mode	Weld Output Range	Rated Welding Output	Maximum Open Circuit Voltage	Generator Power Rating	Fuel Capacity	Engine
CC/AC	50 – 225 A	225 A, 25 V, 100% Duty Cycle	80	**Peak:** 10 kVA/kW **Continuous**: 9.5 kVA/kW, Single-Phase, 84/42 A, 120/240 V AC, 60 Hz (while not welding)	10 gal (38 L) Tank	Kohler CH-20 Air-Cooled, Two-Cylinder, Four-Cycle, 20 HP Gasoline Engine
CC/DC	50 – 210 A	210 A, 25 V, 100% Duty Cycle	72			
CV/DC	17 – 28 V	200 A, 20 V, 100% Duty Cycle	33			

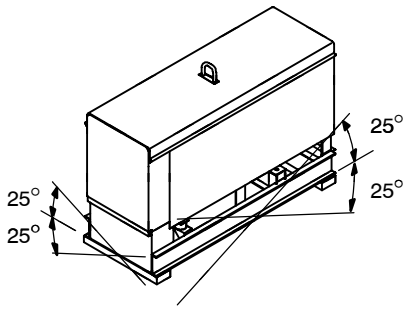
4-2. Dimensions, Weights, and Operating Angles

Dimensions	
Height	33-1/2 in (851 mm)
Width	18-3/4 in (476 mm)
Depth	46 in (1164 mm)
A	18 in (457 mm)
B	16-1/2 in (419 mm)
C	3/4 in (19 mm)
D	3-1/8 in (79 mm)
E	32-3/4 in (832 mm)
F	45-1/2 in (1156 mm)
G	13/32 in (10 mm) Dia.
Weight	
512 lb (232 kg)	



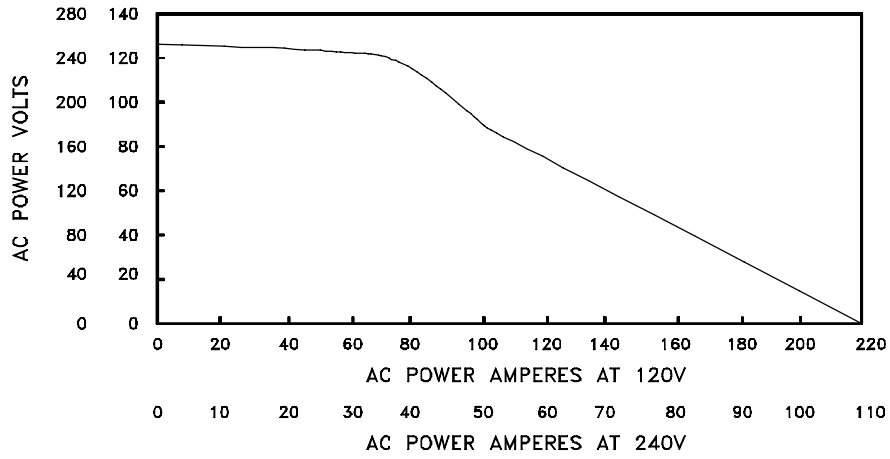
▲ **Do not exceed tilt angles or engine could be damaged or unit could tip.**

▲ **Do not move or operate unit where it could tip.**



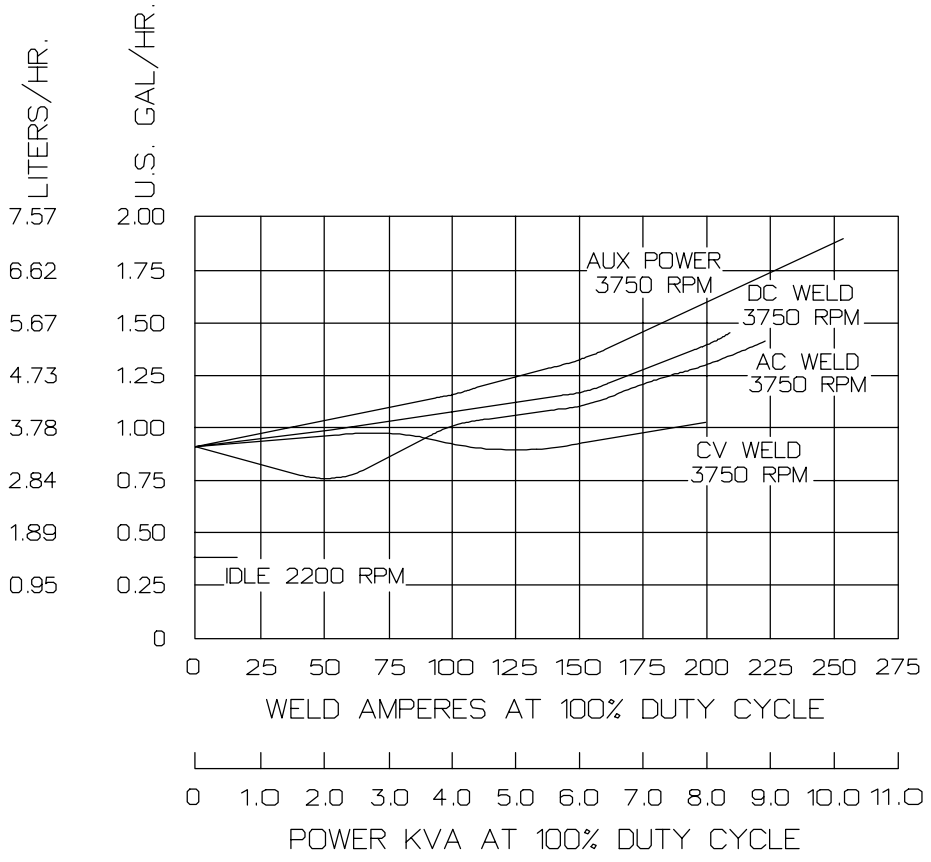
4-3. Generator Power Curve

The generator power curve shows the generator power in amperes available at the receptacles.



200 294-A

4-4. Fuel Consumption

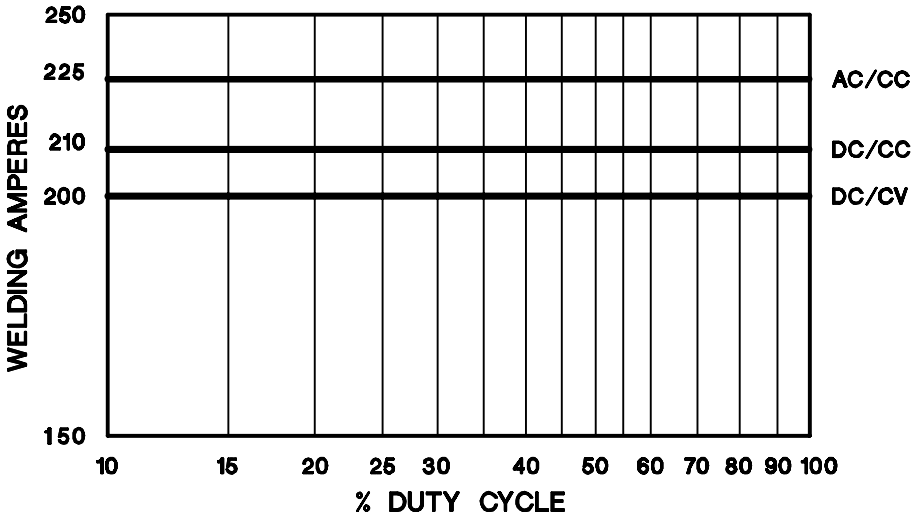


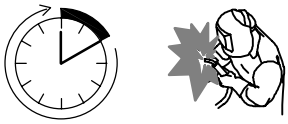
179 939

4-5. Duty Cycle

Duty cycle is the percentage of 10 minutes that unit can weld at rated load without overheating.

▲ **Exceeding duty cycle can damage unit and void warranty.**





Continuous Welding

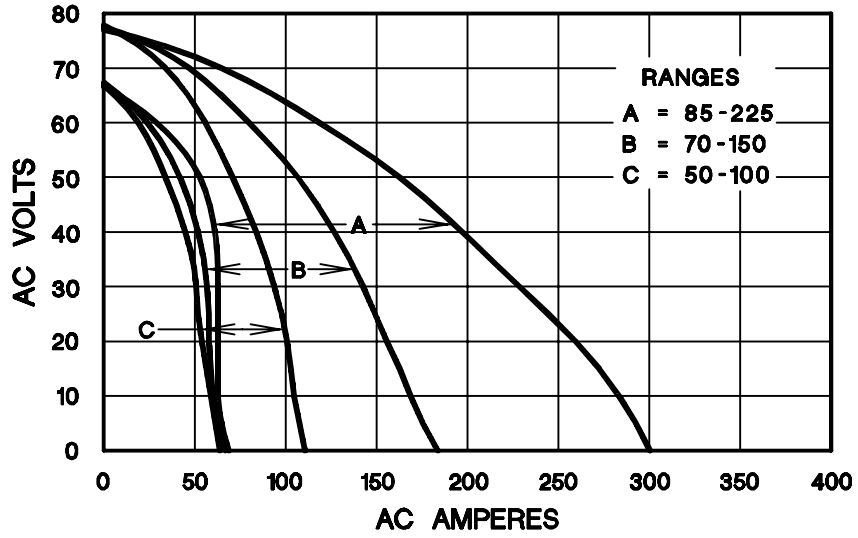
100% Duty Cycle at 225 Amperes CC/AC, 210 Amperes CC/DC, 200 Amperes CV/DC

119 454-A

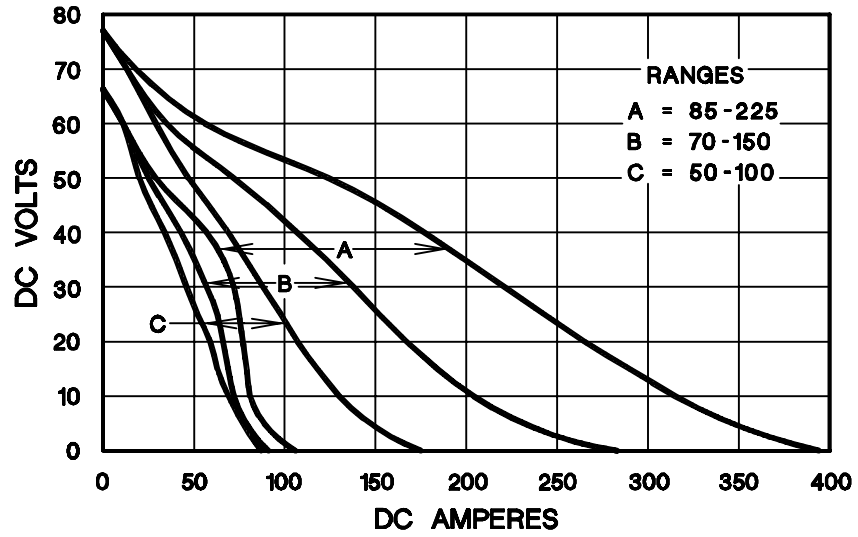
4-6. Volt-Ampere Curves

The volt-ampere curve shows the minimum and maximum voltage and amperage output capabilities of the welding generator. Curves of all other settings fall between the curves shown.

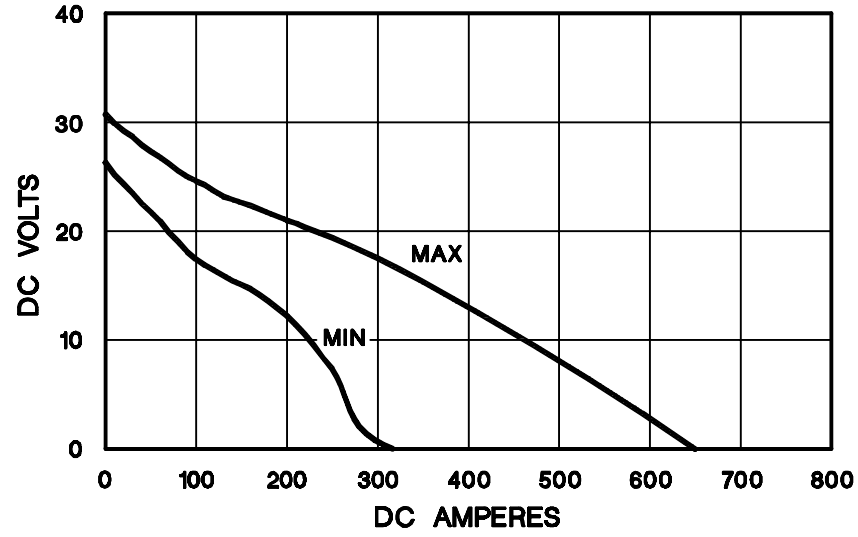
A. For CC/AC Mode



B. For CC/DC Mode



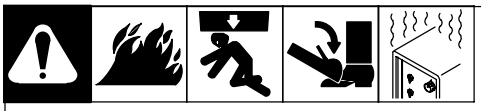
C. For CV/DC Mode



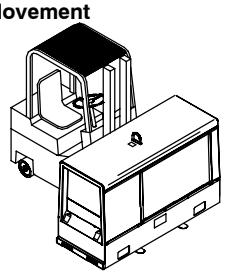
166 024-A / 166 025-A / 166 026-A

SECTION 5 – INSTALLATION

5-1. Installing Welding Generator

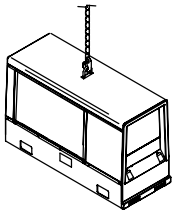


Movement

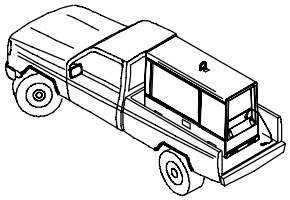


▲ **Do not lift unit from end.**

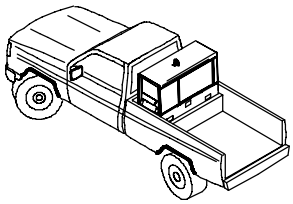
OR



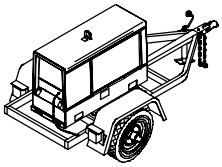
Location



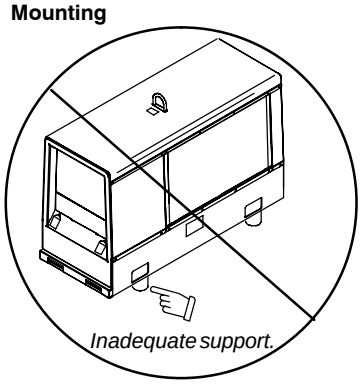
OR

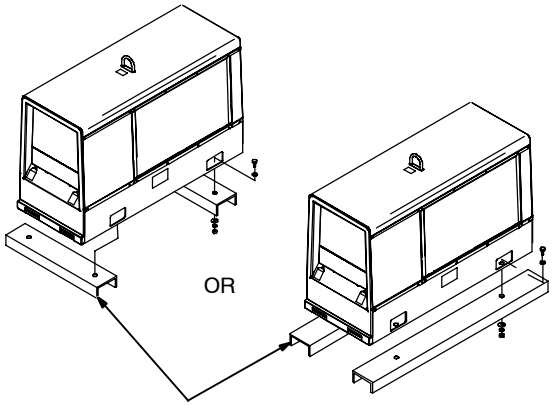


OR



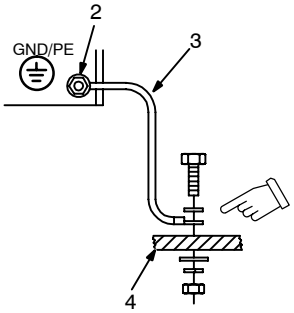
Mounting





▲ **Do not use flexible mounts.**

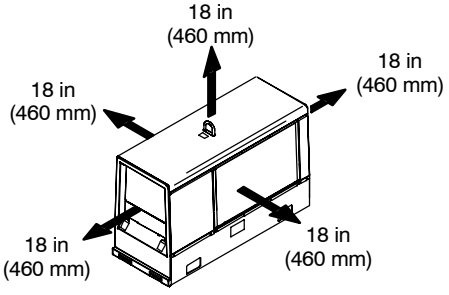
Grounding



Electrically bond generator frame to vehicle frame by metal-to-metal contact.

▲ **Bed liners, shipping skids, and some running gears insulate the welding generator from the vehicle frame. Always connect a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.**

Airflow Clearance



▲ **Do not weld on base. Welding on base can cause fuel tank fire or explosion. Bolt unit down using holes provided in base.**

▲ **Always securely fasten welding generator onto transport vehicle or trailer and comply with all DOT and other applicable codes.**

▲ **Do not mount unit by supporting the base only at the four mounting holes. Use cross-supports to adequately support unit and prevent damage to base.**

▲ **Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.**

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

Mounting:

1 Cross-Supports

Mount unit on flat surface or use cross-supports to support base.

Grounding:

2 Equipment Grounding Terminal (On Front Panel)

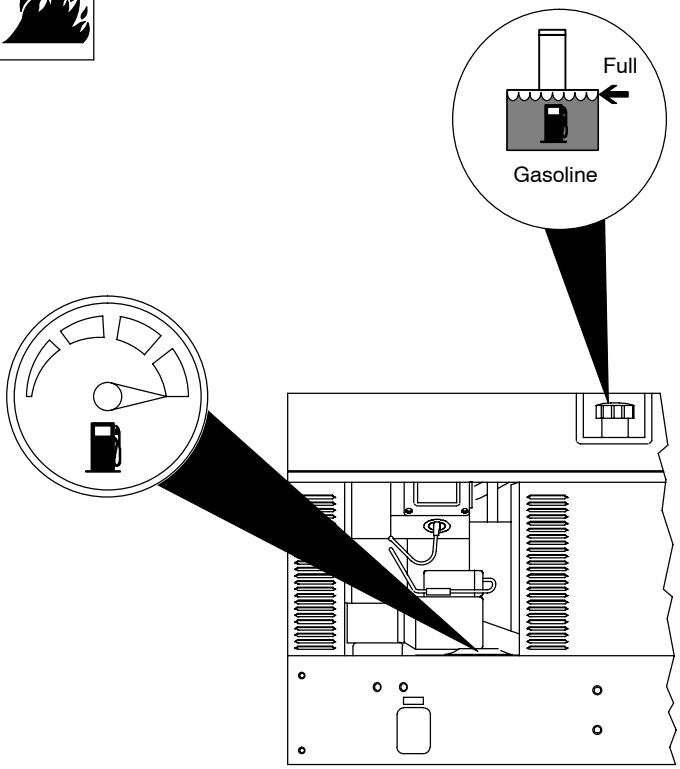
3 Grounding Cable (Not Supplied)

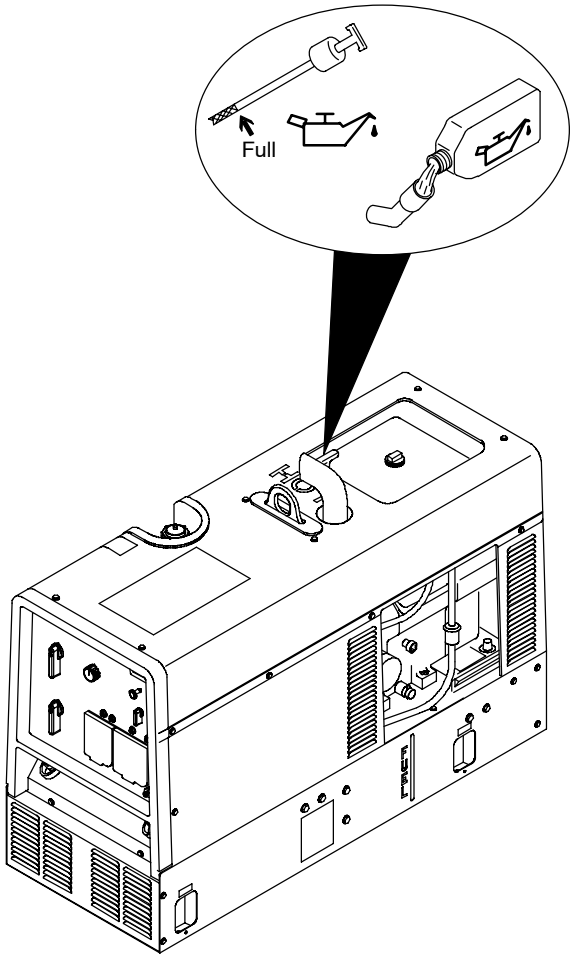
4 Metal Vehicle Frame

Connect cable from equipment ground terminal to metal vehicle frame. Use #10 AWG or larger insulated copper wire.

install2 5/03 – Ref. 800 652 / Ref. 800 477-A / 803 274

5-2. Engine Prestart Checks





Check all fluids daily. Engine must be cold and on a level surface. Unit is shipped with 10W30 engine oil.

☞ *Follow run-in procedure in engine manual.*

☞ *This unit has a low oil pressure shutdown switch. However, some conditions may cause engine damage before the engine shuts down. Check oil level often and do not use the oil pressure shutdown system to monitor oil level.*

Fuel

To help prime the fuel system at initial start-up, fill tank with fresh fuel (see maintenance label for specifications). Always leave filler neck empty to allow room for expansion. Check fuel level on a cold engine before use each day.

Oil

☞ *Do not exceed the "Full" mark on the oil level dipstick. The fuel pump may operate erratically if crankcase is overfilled.*

After fueling, check oil with unit on level surface. If oil is not up to full mark on dipstick, add oil (see maintenance label).

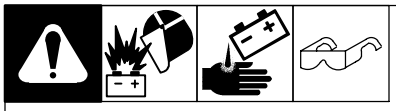
☞ *To improve cold weather starting:*

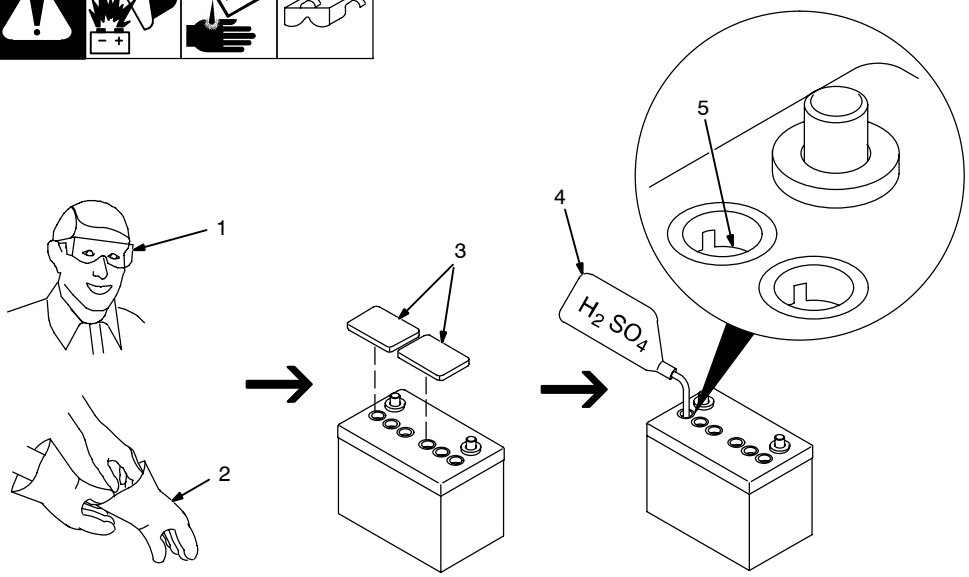
Keep battery in good condition. Store battery in warm area.

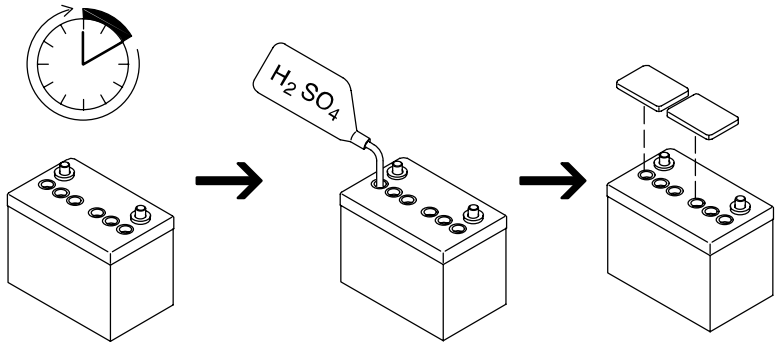
Use correct grade oil for cold weather.

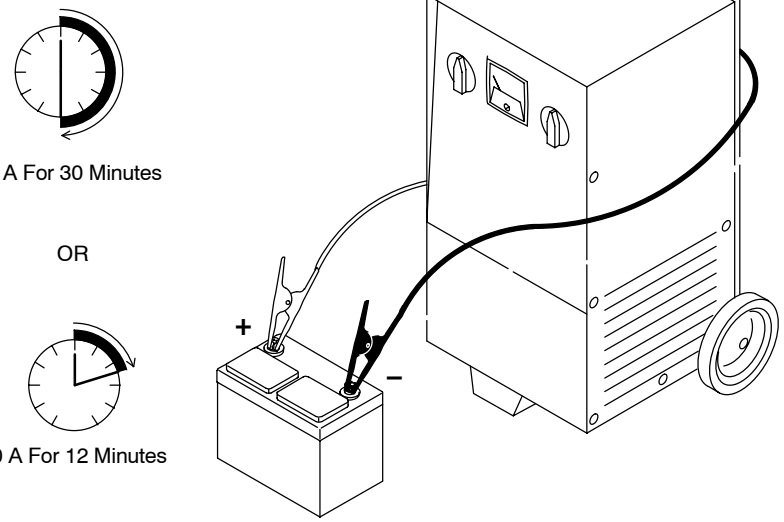
Ref. 801 188-E / Ref. 801 221-A

5-3. Activating The Dry Charge Battery (If Applicable)









5 A For 30 Minutes

OR

30 A For 12 Minutes

Remove battery from unit.

1 Eye Protection – Safety Glasses Or Face Shield

2 Rubber Gloves

3 Vent Caps

4 Sulfuric Acid Electrolyte (1.265 Specific Gravity)

5 Well

Fill each cell with electrolyte to **bottom** of well (maximum).

▲ **Do not overfill battery cells.**

Wait ten minutes and check electrolyte level. If necessary, add electrolyte to raise to proper level. Reinstall vent caps.

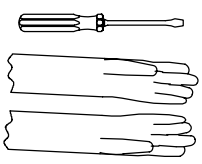
6 Battery Charger

▲ **Read and follow all instructions supplied with battery charger.**

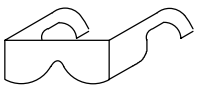
Charge battery for 12 minutes at 30 amperes or 30 minutes at 5 amperes. Disconnect charging cables and install battery.

☞ *When electrolyte is low, add only distilled water to cells to maintain proper level.*

Tools Needed:



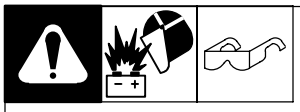
rubbergloves

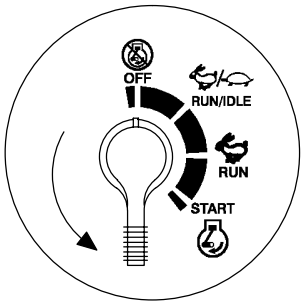


glasses

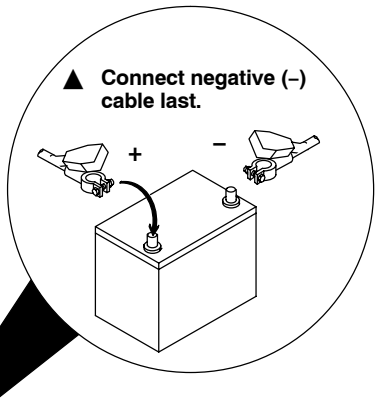
drybatt1 1/98 – S-0886

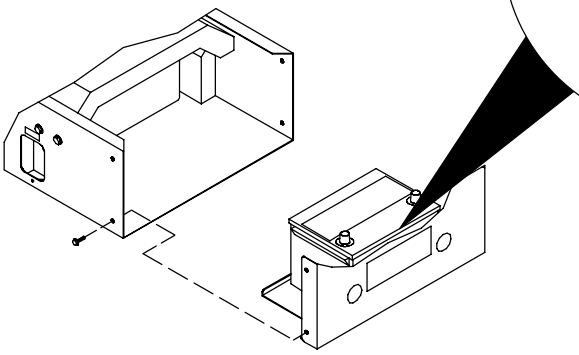
5-4. Connecting the Battery





▲ **Connect negative (–) cable last.**





Tools Needed:

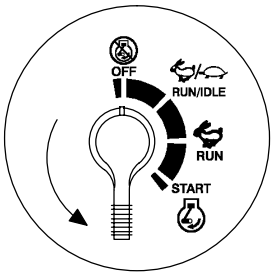
3/8, 1/2 in

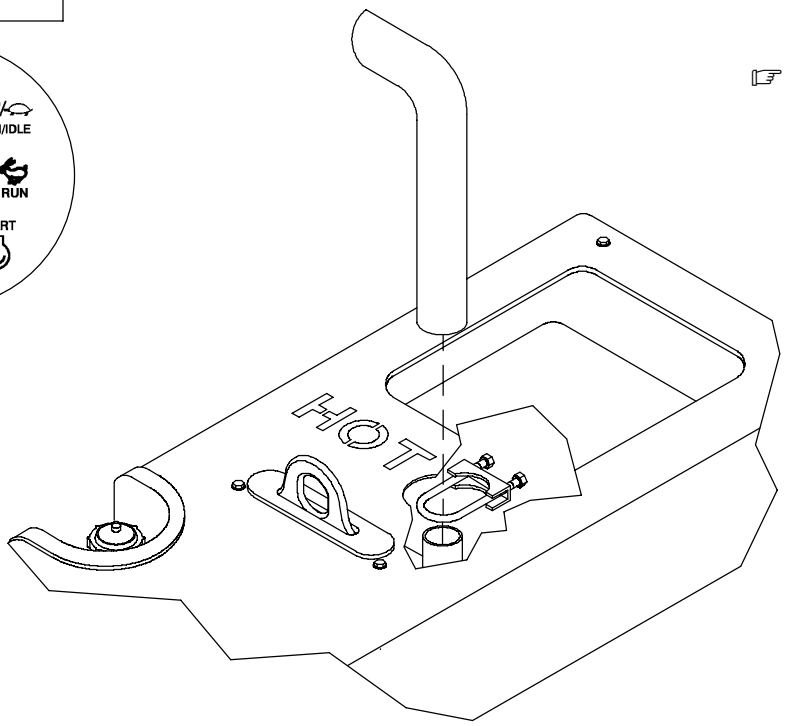
Ref. 800 394-C / Ref. 183 175-A / Ref. S-0756-D

5-5. Installing Exhaust Pipe

▲ **Engine backfire can cause severe burns or other injuries. Do not point exhaust pipe toward control panel. Keep away from exhaust outlet.**

☞ *Point exhaust pipe in desired direction but always away from front panel and direction of travel.*



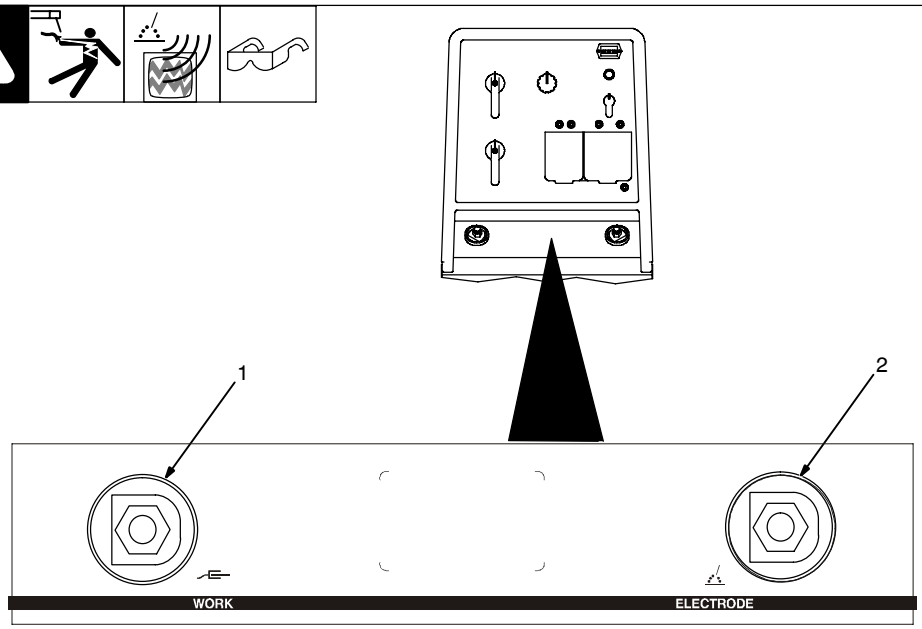


Tools Needed:

1/2 in

Ref. 801 681 / Ref. 183 175-A

5-6. Connecting to Weld Output Terminals



1 Work Weld Output Terminal

2 Electrode Weld Output Terminal

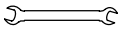
Connect work cable to Work terminal.

Connect electrode holder cable or electrode weld cable to Electrode terminal for Stick and MIG welding.

Connect torch cable to Electrode terminal for TIG welding.

Use Process Selector switch to select type of weld output (see Section 6-1).

Tools Needed:



3/4 in

800 396-B / Ref. 208 296-C

5-7. Selecting Weld Cable Sizes*

Weld Output Terminals

▲ Turn off power before connecting to weld output terminals.

▲ Do not use worn, damaged, undersized, or poorly spliced cables.

Welding Amperes	Weld Cable Size** and Total Cable (Copper) Length in Weld Circuit Not Exceeding***							
	100 ft (30 m) or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
	10 – 60% Duty Cycle	60 – 100% Duty Cycle	10 – 100% Duty Cycle					
100	4 (20)	4 (20)	4 (20)	3 (30)	2 (35)	1 (50)	1/0 (60)	1/0 (60)
150	3 (30)	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	3/0 (95)
200	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	4/0 (120)
250	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 2/0 (2x70)
300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)
350	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)
400	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	2 ea. 4/0 (2x120)
500	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)	3 ea. 3/0 (3x95)

* This chart is a general guideline and may not suit all applications. If cable overheating occurs, use next size larger cable.

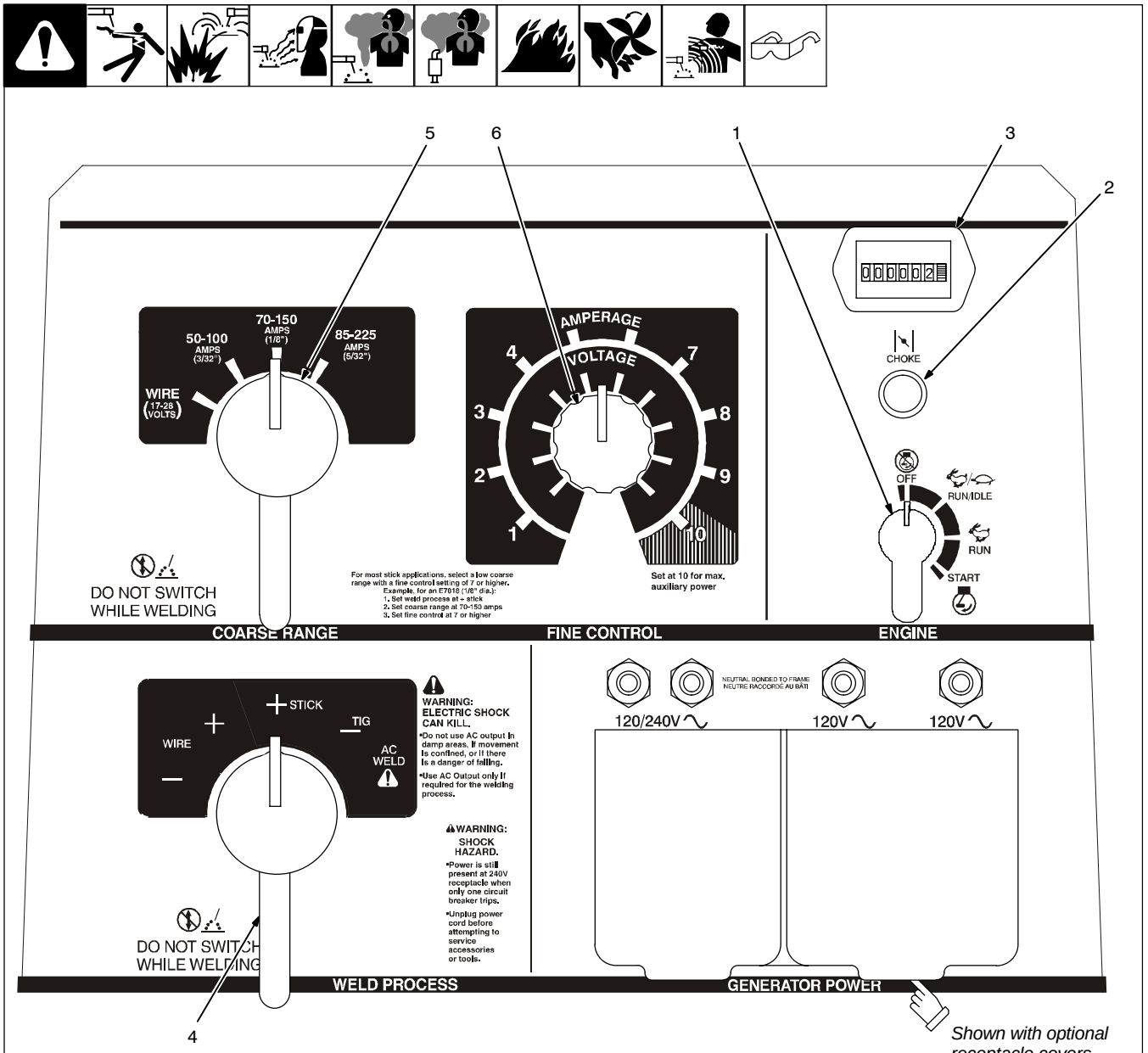
**Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere.
( ) = mm^2 for metric use

S-0007-F–

***For distances longer than those shown in this guide, call a factory applications representative at 920-735-4505.

SECTION 6 – OPERATING THE WELDING GENERATOR

6-1. Front Panel Controls


5
6
1
3
2
50-100 AMPS (3/32")
70-150 AMPS (1/8")
85-225 AMPS (5/32")
WIRE (17-28 VOLTS)
DO NOT SWITCH WHILE WELDING
COARSE RANGE
AMPERAGE
VOLTAGE
For most stick applications, select a low coarse range with a fine control setting of 7 or higher. Example, for an E7018 (1/8" dia.):
1. Set weld process at – stick
2. Set coarse range at 70-150 amps
3. Set fine control at 7 or higher
Set at 10 for max. auxiliary power
FINE CONTROL
CHOKE
OFF
RUN/IDLE
RUN
START
ENGINE
STICK
TIG
WIRE
AC WELD
WARNING: ELECTRIC SHOCK CAN KILL.
•Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
•Use AC Output only if required for the welding process.
WARNING: SHOCK HAZARD.
•Power is still present at 240V receptacle when only one circuit breaker trips.
•Unplug power cord before attempting to service accessories or tools.
DO NOT SWITCH WHILE WELDING
4
WELD PROCESS
NEUTRAL BONDED TO FRAME
NEUTRE RACCORDE AU BÂTI
120/240V
120V
120V
GENERATOR POWER
Shown with optional receptacle covers.

Ref. 208 296-C

1 Engine Control Switch

Use switch to start engine, select speed, and stop engine. In Run/Idle position, engine runs at idle speed at no load, and weld/power speed under load. In Run position, engine runs at weld/power speed.

☞ *Place switch in Run position to operate most MIG equipment.*

2 Engine Choke Control

Use control to change engine air-fuel mix.

To Start: pull out choke and turn Engine Control switch to Start position. Release switch and slowly push choke in when engine starts.

☞ *If the engine does not start, let engine come to a complete stop before attempting restart.*

To Stop: turn Engine Control switch to Off position.

3 Engine Hour Meter

4 Weld Process Selector Switch

▲ **Do not switch under load.**

Use switch to select type of weld output.

Use a positive (+) position for Direct Current Electrode Positive (DCEP) and a negative (–) position for Direct Current Electrode Negative. Use AC position for alternating current.

5 Coarse Range Switch

▲ **Do not switch under load.**

Use switch to select weld amperage range when Weld Process Selector switch is in Stick/Tig position, or voltage range when switch is in Wire position.

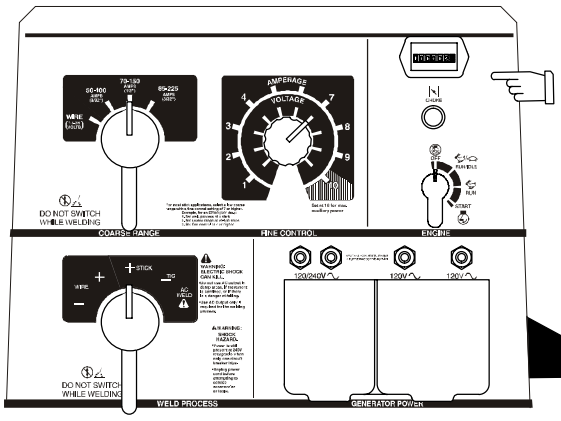
☞ *For best arc starts, use lowest amperage range possible.*

6 Fine Control

Use control to select weld amperage (Stick/Tig) or voltage (Wire) within the range selected by the Coarse Range switch. Control may be adjusted while welding. Weld output would be 110 A DC based on control settings shown (50% of 70 to 150 A). Set control at 10 for maximum generator power.

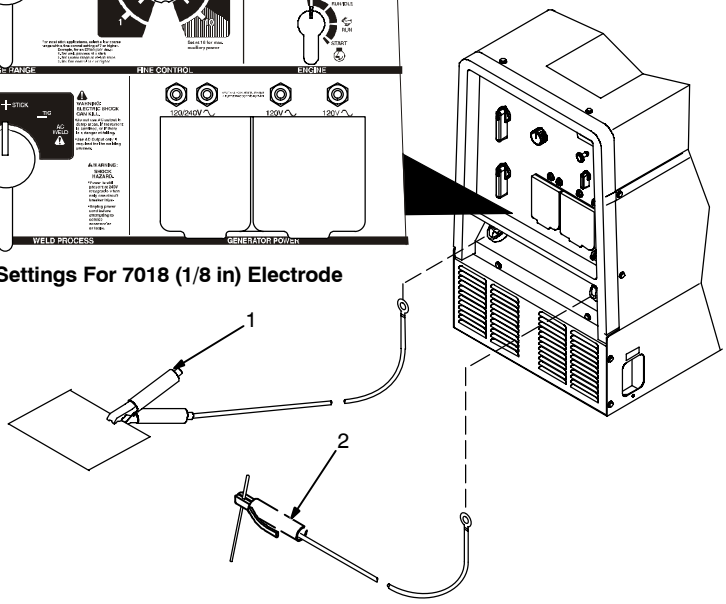
☞ *See Sections 6-2 thru 6-4 for typical process connections and control settings.*

6-2. Typical Stick Welding Connections And Control Settings



Typical Settings For 7018 (1/8 in) Electrode

For best arc starts and best results using weld and generator power together, use a low Coarse Range setting and the Fine Control set at 7 or higher.



▲ **Stop engine.**

☞ *This section provides general guidelines and may not suit all applications.*

☞ *The control panel shows the typical settings for welding with a 7018 (1/8 in) electrode. Consult the amperage selection tables below if welding with other electrodes.*

1 Work Clamp

2 Electrode Holder

Connect Work cable to Work terminal and Electrode holder cable to Electrode terminal on welding generator.

☞ *Be sure to use the correct size weld cables (see Section 5-7).*

☞ *For best performance, set the Coarse Range switch to the **lowest** range that covers the desired weld amperage. Use the Fine Control to select the desired amperage within the range selected. When properly set, the Fine Control is normally set at 7 or higher.*

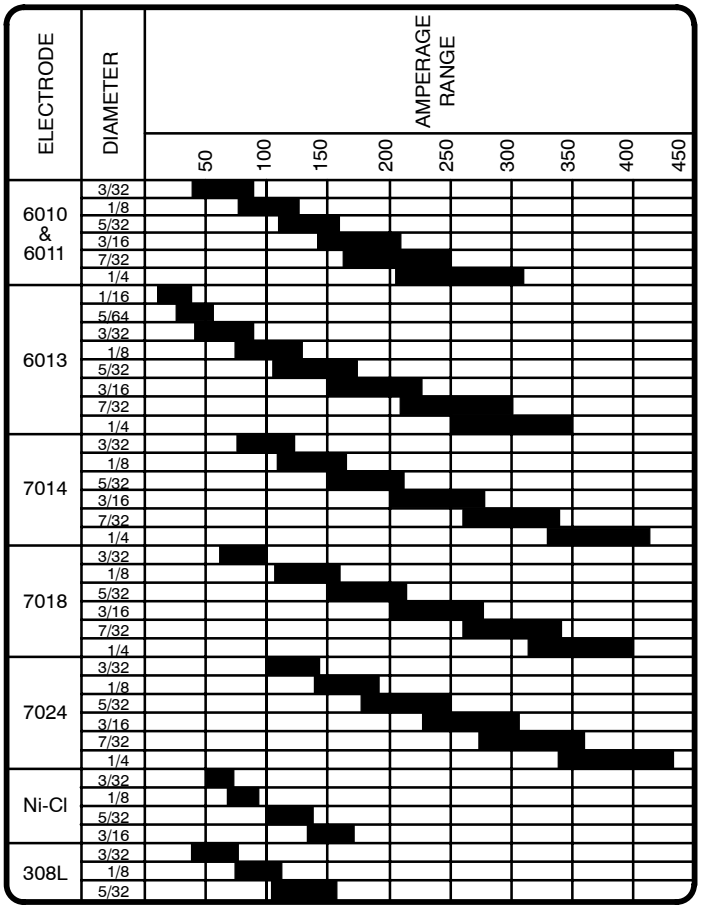
Typical Settings For 7018 (1/8 in) Electrode:

> Set Weld Process Selector switch to + Stick position.

> Set Coarse Range switch to 70-150 (1/8") position.

> Set Fine Control at 7 or higher for best results.

Electrode Selection Tables



ELECTRODE	DC*	AC	POSITION	PENETRATION	USAGE
6010	EP		ALL	DEEP	MIN. PREP, ROUGH HIGH SPATTER
6011	EP	✓	ALL	DEEP	
6013	EP,EN	✓	ALL	LOW	GENERAL
7014	EP,EN	✓	ALL	MED	SMOOTH, EASY, FAST
7018	EP	✓	ALL	LOW	LOW HYDROGEN, STRONG
7024	EP,EN	✓	FLAT HORIZ FILLET	LOW	SMOOTH, EASY, FASTER
NI-CL	EP	✓	ALL	LOW	CAST IRON
308L	EP	✓	ALL	LOW	STAINLESS

*EP = ELECTRODE POSITIVE (REVERSE POLARITY)
EN = ELECTRODE NEGATIVE (STRAIGHT POLARITY)

Tools Needed:

3/4 in

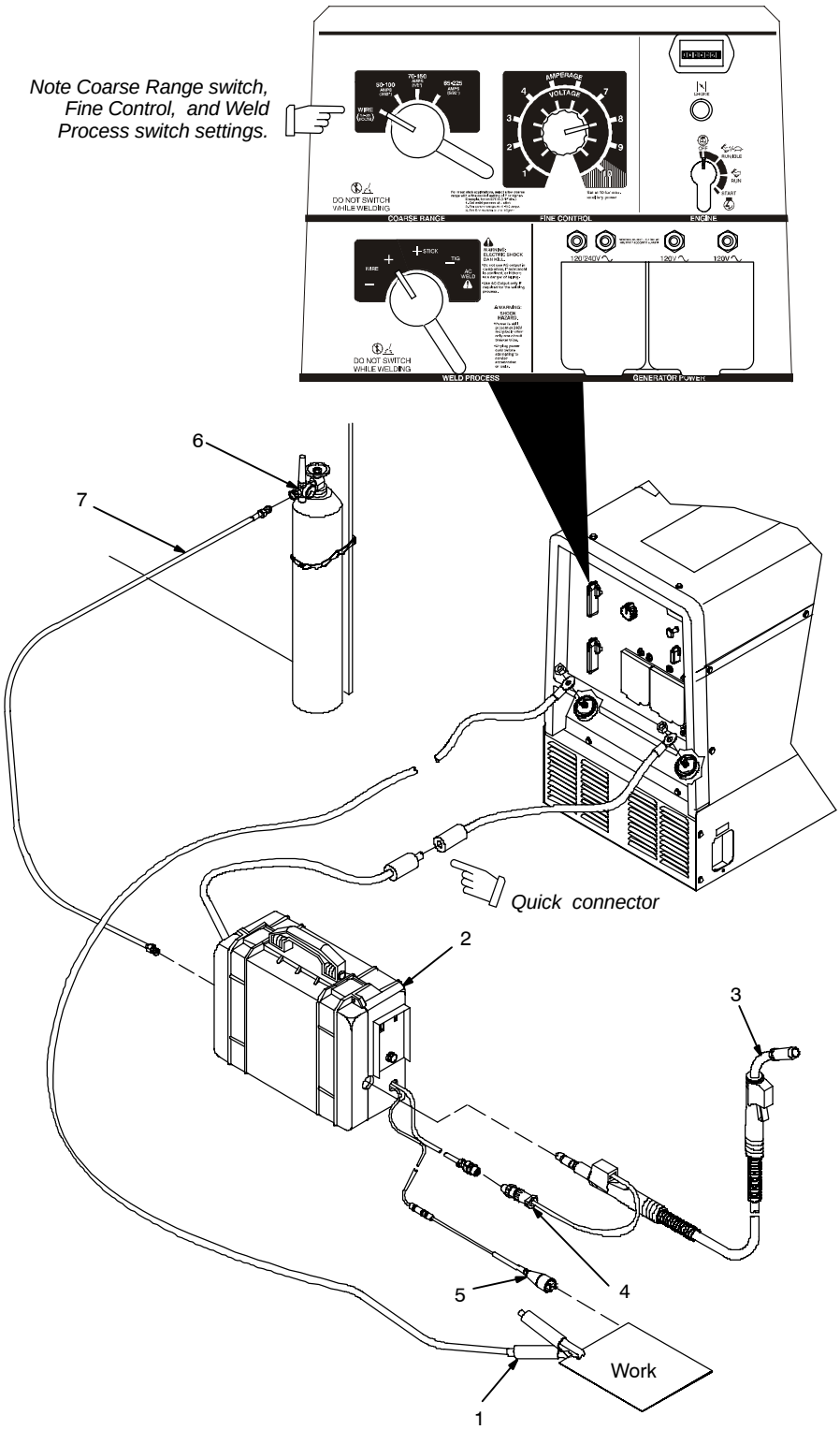
Ref. 800 395 / 208 296-C / 087 985-A / Ref. S-0653

6-3. Typical MIG Welding Connections And Settings

A. Solid Wire Applications

Typical Control Settings For .035 (ER70S-3)
Solid Wire – Short Circuit Transfer

Note Coarse Range switch, Fine Control, and Weld Process switch settings.



Tools Needed:

3/4 in

▲ **Stop engine.**

☞ *This section provides general guidelines and may not suit all applications.*

☞ *The control panel shows the typical settings for welding with .035 (ER70S-3) solid wire. Use Argon-based shielding gas.*

1 Work Clamp
2 Voltage Sensing Wire Feeder
3 MIG Gun
4 Gun Trigger Plug
5 Voltage Sensing Clamp
6 Gas Cylinder:

75/25 Argon-Based Gas for Short Circuit Transfer

7 Gas Hose

Connect work cable to welding generator Work terminal. Connect cable from wire feeder to cable from welding generator Electrode terminal.

☞ *Be sure to use the correct size weld cables (see Section 5-7).*

Loosen MIG gun securing knob. Insert gun end through opening in feeder and position as close as possible to drive rolls without touching. Tighten knob.

See wire feeder manual for wire threading procedure.

Insert gun trigger plug (item 4) into matching receptacle and tighten threaded collar.

Connect gas hose from feeder to regulator on cylinder.

Typical Control Settings For Short Circuit Transfer Using .035 (ER70S-3) Solid Wire And 75/25 Argon-Based Gas:

> Set Weld Process Selector switch to Wire + (DCEP) position.

> Set Coarse Range switch to Wire (17-28 volts) position.

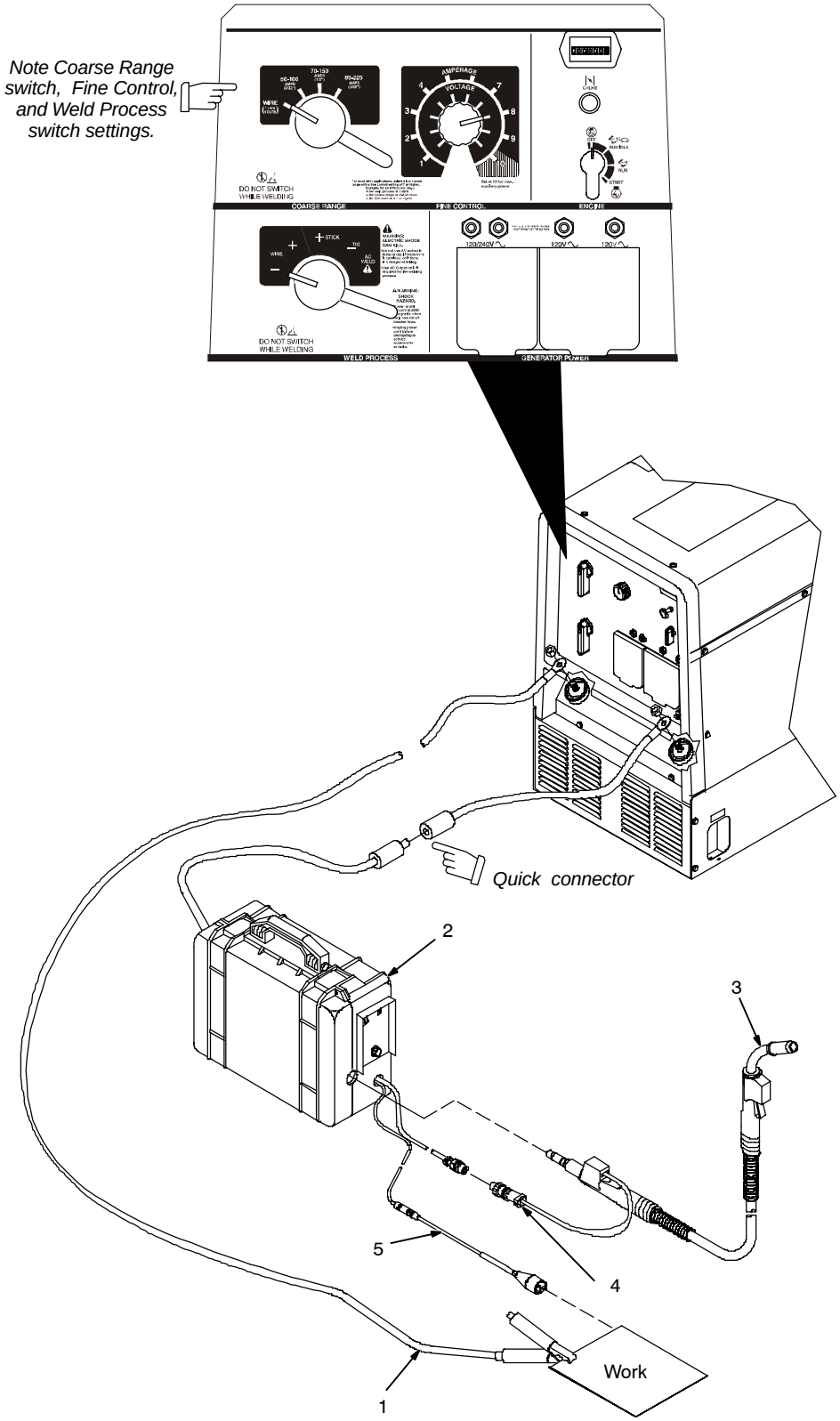
> Set Fine Control to obtain minimum spatter.

> Set wire feed speed between 150-300 ipm.

802 766 / 208 296-C

B. Self-Shielded Flux Core Wire Applications

Typical Control Settings For .045 (71T-11) Self-Shielded Flux Core Wire



Tools Needed:

3/4 in

▲ **Stop engine.**

☞ *This section provides general guidelines and may not suit all applications.*

☞ *The control panel shows the typical settings for welding with* .045 (71T-11) self-shielded flux core wire.

1 Work Clamp

2 Wire Feeder

3 MIG Gun

4 Gun Trigger Plug

5 Voltage Sensing Clamp

Connect work cable to welding generator Work terminal. Connect cable from wire feeder to cable from welding generator Electrode terminal.

☞ *Be sure to use the correct size weld cables (see Section 5-7).*

Loosen MIG gun securing knob. Insert gun end through opening in feeder and position as close as possible to drive rolls without touching. Tighten knob.

See wire feeder manual for wire threading procedure.

Insert gun trigger plug (item 4) into matching receptacle and tighten threaded collar.

Typical Control Settings Using .045 (71T-11) Self-Shielded Flux Core Wire :

> Set Weld Process Selector switch to Wire – position (DCEN).

> Set Coarse Range switch to 17-28 volts position.

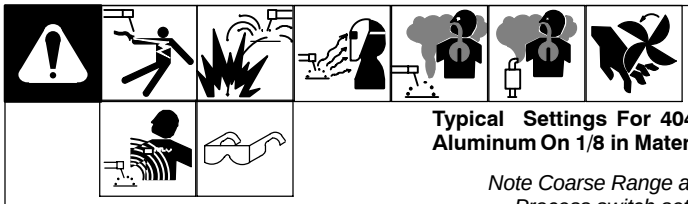
> Set Fine Control to obtain desired voltage.

> Set wire feed speed between 125-200 ipm.

> Do a test weld. To increase arc length, increase Fine Control setting. To shorten arc length, reduce fine control setting or increase wire feed speed.

802 766 / 208 296-C

6-4. Typical MIG Connections And Settings Using Weld Control And Spoolgun

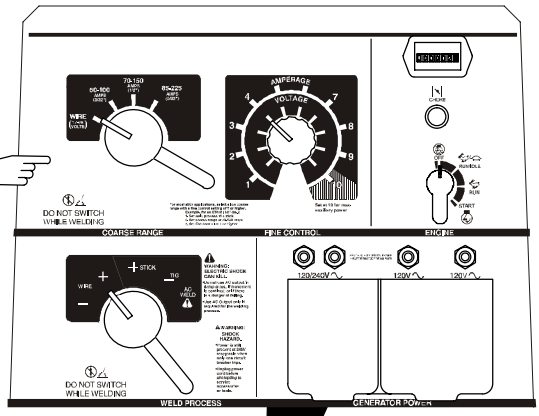


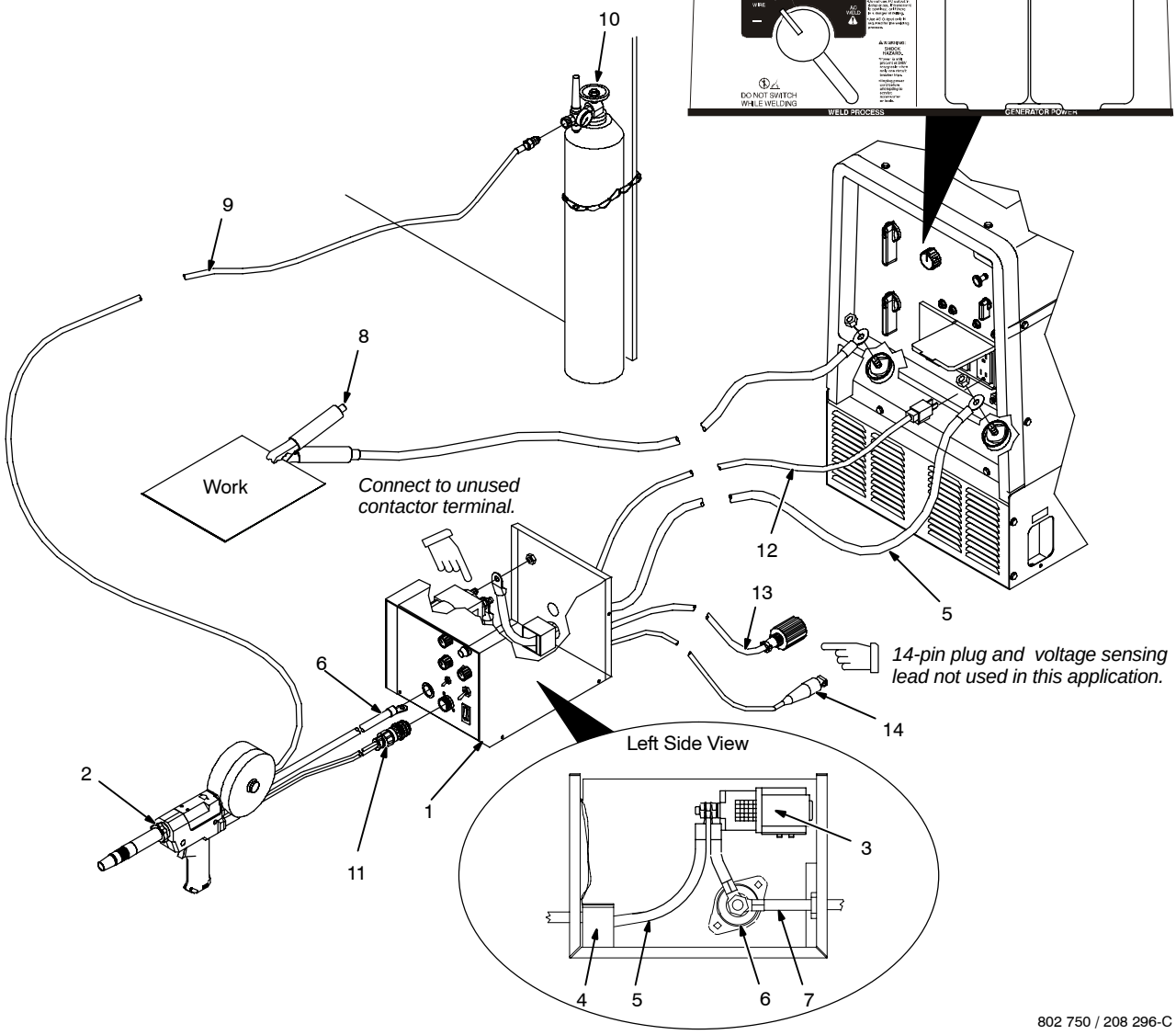
Typical Settings For 4043 (.035) Aluminum On 1/8 in Material:

Note Coarse Range and Weld Process switch settings.

Tools Needed:

3/4 in





802 750 / 208 296-C

☞ *This section provides general guidelines and may not suit all applications.*

1 Weld Control
2 Spoolgun
3 Optional Contactor (Recommended)
4 Reed Switch
5 Weld Cable (Customer-Supplied)
6 Weld Control Weld Terminal
7 Weld Power Cable From Spoolgun
8 Work Clamp
9 Gas Hose
10 Argon Cylinder
11 Trigger Control Cord
12 Input Power Cord
13 14-Pin Plug (Not Used)
14 Voltage Sensing Lead (Not Used)

☞ *Be sure to use the correct size weld cables (see Section 5-7).*

Route weld cable (item 5) from welding generator Electrode terminal through reed switch (item 4) to unused terminal on contactor (item 3). Connect weld cable from spoolgun to weld control weld terminal (item 6).

Connect work cable (item 8) to welding generator Work terminal.

Insert trigger control plug (item 11) into weld control receptacle. Tighten threaded collar.

Connect ac power cord (item 12) to 120 volt ac receptacle on welding generator.

Connect gas hose (item 9) from spoolgun to regulator on Argon cylinder (item 10).

Reinstall weld control wrapper.

Typical Settings For 4043 (.035) Aluminum On 1/8 in Material:

> Set Weld Process Selector switch to Wire + (DCEP) position.

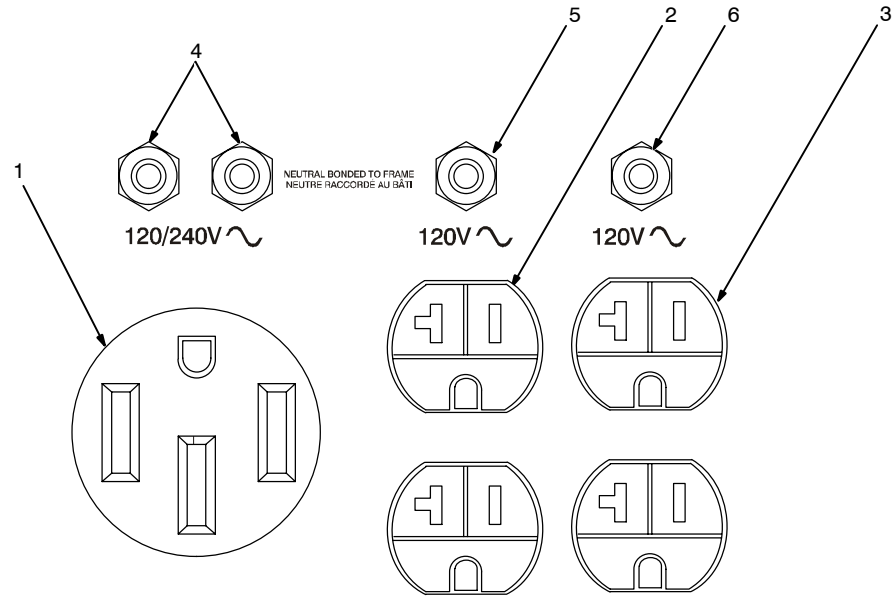
> Set Coarse Range switch to Wire (17-28 volts) position.

> Set Fine Control to desired voltage (arc length). Start with a low voltage setting (about 4) to prevent burnback, then adjust to achieve desired weld performance.

> Set wire feed speed between 240-270 ipm.

SECTION 7 – OPERATING AUXILIARY EQUIPMENT

7-1. Standard Receptacles



GENERATOR POWER

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

☞ *Generator power decreases as weld current increases.*

Set Fine Control R1 at 10 for full generator power.

1 240 V 50 A AC Receptacle RC1

RC1 supplies 60 Hz single-phase power at weld/power speed. Maximum output is 10 kVA/kW.

2 120 V 20 A AC Duplex Receptacle RC2

3 120 V 20 A AC Duplex Receptacle RC3

RC2 and RC3 supply 60 Hz single-phase power at weld/power speed. Maximum output from RC2 or RC3 is 2.4 kVA/kW. (CSA : 1.8 kVA/kW).

4 Circuit Breakers CB1 and CB2

CB1 and CB2 protect RC1 from overload. If CB1 or CB2 opens, RC1 and one of the 120 volt receptacles does not work. 120 volts may still be present at RC1.

▲ **Power is still present at the 240 volt receptacle when only one circuit breaker trips.**

Unplug power cord before attempting to service accessories or tools.

5 Circuit Breaker CB3

6 Circuit Breaker CB4

CB3 protects RC2 and CB4 protects RC3 from overload. If a circuit breaker opens, the receptacle does not work.

☞ *Press button to reset circuit breaker. If breaker continues to open, contact Factory Authorized Service Agent.*

Combined output of all receptacles limited to 10 kVA/kW rating of the generator.

EXAMPLE: If 20 A is drawn from each 120 V duplex receptacle, only 21 A is available at the 240V receptacle:

2 x (120 V x 20 A) + (240 V x 21 A) = 10 kVA/kW

7 Generator Power While Welding Label

7

SIMULTANEOUS WELDING AND POWER WITH FINE ADJUST SET AT 10

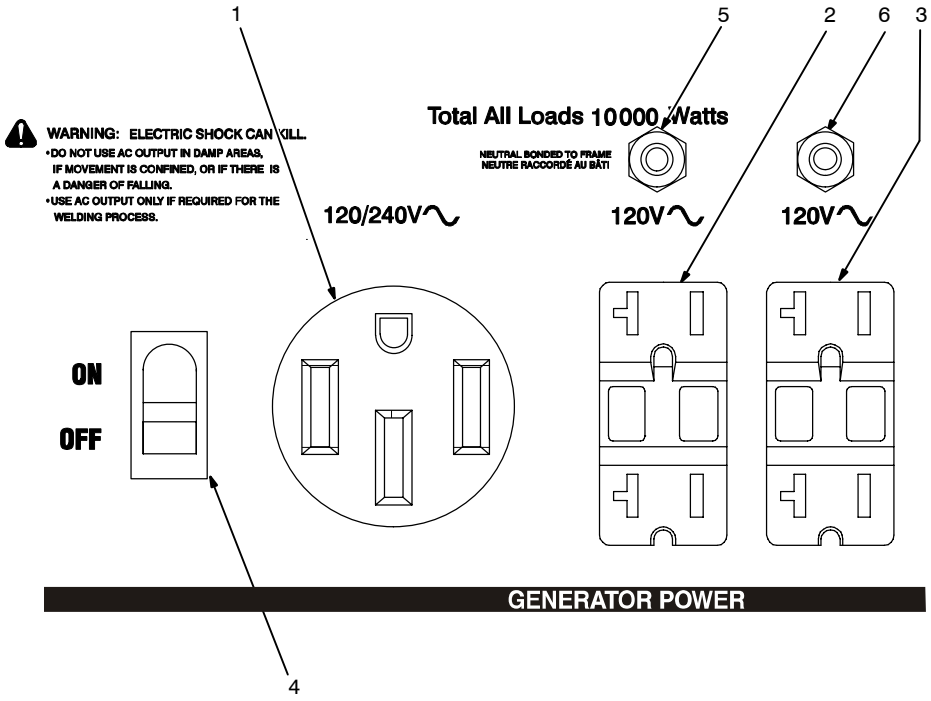
Weld Current In Amperes	Total Power In Watts	120V Receptacle Amperes	240V Receptacle Amperes
210	1300	10	5
140	5200	42	21
90	8400	70	35

See Owner's Manual for additional information.

S-166 360-B

Ref. 208 296-C

7-2. GFCI/CSA Receptacle Option



SIMULTANEOUS WELDING AND POWER WITH FINE ADJUST SET AT 10

Weld Current In Amperes	Total Power In Watts	120V Receptacle Amperes	240V Receptacle Amperes
210	1300	10	5
140	5200	42	21
90	8400	70	35

See Owner's Manual for additional information.

S-166 360-B

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

1 120/240 V 50 A AC Receptacle RC1

RC1 supplies 60 Hz single-phase power at weld/power speed. Maximum output is 10 kVA/kW.

2 120 V 20 A AC GFCI Receptacle RC2

3 120 V 20 A AC GFCI Receptacle RC3

RC2 and RC3 supply 60 Hz single-phase power at weld/power speed. Maximum output from RC2 or RC3 is 2.4 kVA/kW.

GFCI2 and GFCI3 supply 60 Hz single-phase power at weld/power speed. Maximum output from GFCI2 or GFCI3 is 2.4 kVA/kW. Circuit breaker protection is the same as standard receptacles.

If a ground fault is detected, the GFCI Reset button pops out and the circuit opens to disconnect the faulty equipment. Check for damaged tools, cords, plugs, etc. connected to the receptacle. Press button to reset receptacle and resume operation.

☞ *At least once a month, run engine at weld/power speed and press Test button to verify GFCI is working properly.*

4 Circuit Breaker CB1

CB1 protects the ac receptacles from overload. If CB1 opens, the ac receptacles do not work.

☞ *Move CB1 toggle switch to On position to reset circuit breaker. If breaker continues to open, contact Factory Authorized Service Agent.*

5 Circuit Breaker CB2

6 Circuit Breaker CB3

CB2 protects GFCI2 and CB3 protects GFCI3 from overload. If a circuit breaker opens, the receptacle does not work.

☞ *Press button to reset circuit breaker. If breaker continues to open, contact Factory Authorized Service Agent.*

Combined output of all receptacles limited to 10 kVA/kW rating of the generator.

EXAMPLE: If 20 A is drawn from each 120 V GFCI receptacle, only 21 A is available at the 240V receptacle:

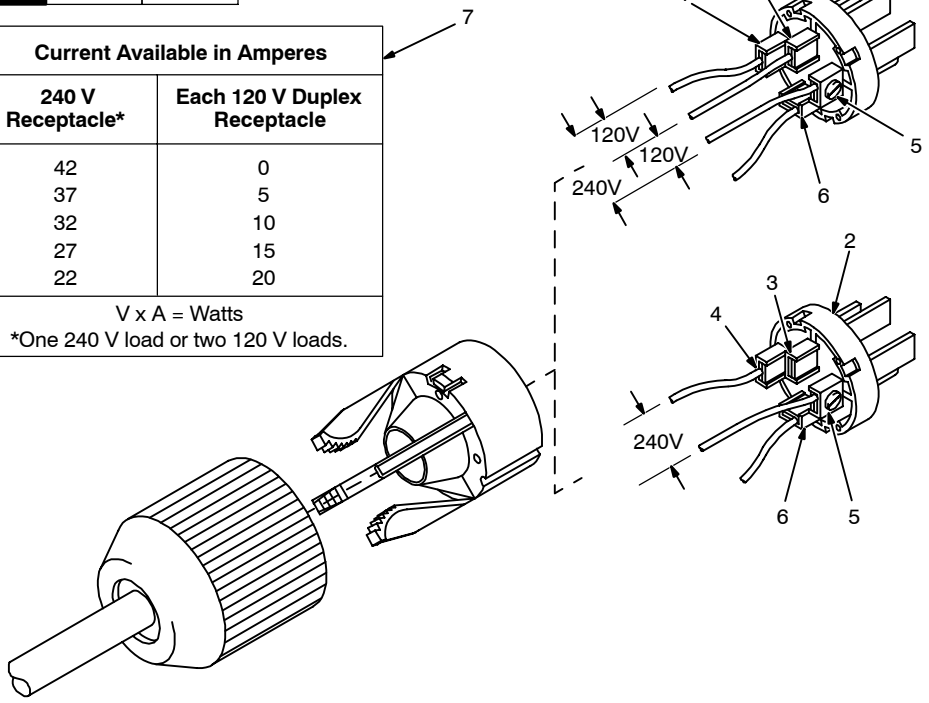
2 x (120 V x 20 A) + (240 V x 21 A) = 10 kVA/kW

7 Generator Power While Welding Label

203 683

7-3. Wiring Optional 240 Volt Plug

Current Available in Amperes	
240 V Receptacle*	**Each 120 V Duplex Receptacle**
42	0
37	5
32	10
27	15
22	20
V x A = Watts *One 240 V load or two 120 V loads.	



The plug can be wired for a 240 V, 2-wire load or a 120/240V, 3-wire load. See circuit diagram.

1 Plug Wired for 120/240 V, 3-Wire Load

When wired for 120 V loads, each duplex receptacle shares a load with one half of 240 V receptacle.

2 Plug Wired for 240 V, 2-Wire Load

3 Neutral (Silver) Terminal

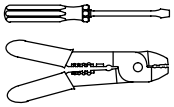
4 Load 1 (Brass)Terminal

5 Load 2 (Brass) Terminal

6 Ground (Green) Terminal

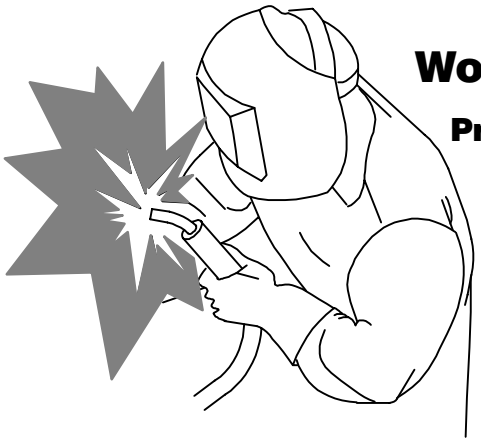
7 Amperes Available Using 120/240 V Plug

Tools Needed:



120 813-D

Notes



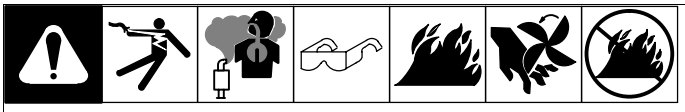
Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.

SECTION 8 – MAINTENANCE

8-1. Routine Maintenance

Note ☞ *Follow storage procedure in engine manual if the unit will not be used for an extended period.*



Recycle engine fluids.

▲ **Stop engine before maintaining.**

☞ *See also Engine Manual and maintenance label. Service engine more often if used in severe conditions.*

* To be done by Factory Authorized Service Agent.

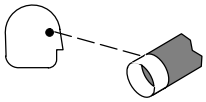
Every 8 h

Wipe up spills.

Check fluid levels. See Section 5-2.

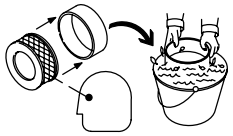
Every 20 h

Check and clean optional spark arrestor screen. See Section 8-7.



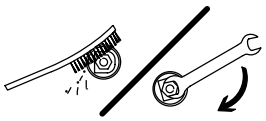
Every 25 h

Service air cleaner wrapper (foam element). See Section 8-3.



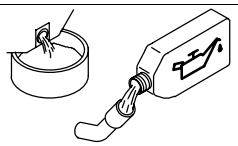
Every 50 h

Clean and tighten weld terminals.

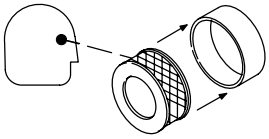


Every 100 h

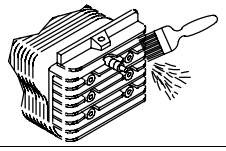
Change oil. See Section 8-4 and maintenance label.



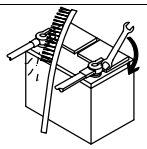
Check air cleaner element. See Section 8-3.



Clean cooling system. See Engine Manual.

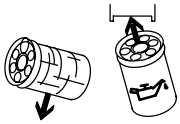


Clean and tighten battery connections.

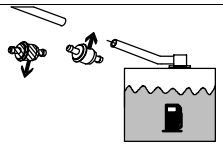


Every 200 h

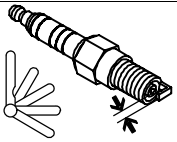
Change oil filter. See Section 8-4 and maintenance label.



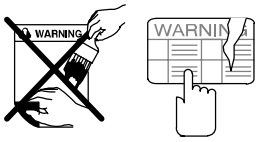
Replace fuel filter. See Section 8-4.



Check spark plugs.

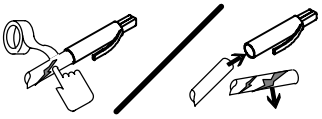


Replace unreadable labels.

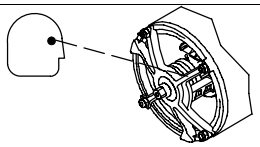


Every 500 h

Repair or replace cracked cables.

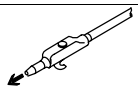


Service welding generator brushes and slip rings. Service more often in dirty conditions.*

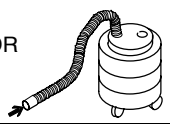


Every 1000 h

Blow out or vacuum inside. During heavy service, clean monthly.



OR



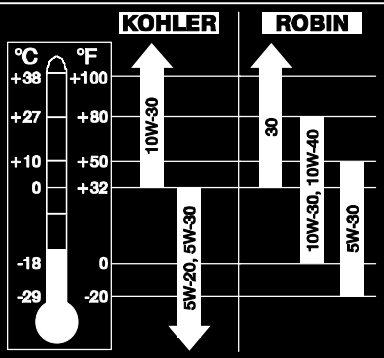
8-2. Maintenance Label

KOHLER CH20, ROBIN EH64/EH65 GAS ENGINES

See Engine Manual for complete engine care. Give Engine Specification and Serial Number when ordering parts.

Check Daily.

To Drain Oil:
Push And Turn CCW
Pull



Recommended Oil
API Service Classification . . . SG or higher (If using LP fuel, use synthetic oil.)
Oil Change . . . . . 100 hours
Oil Filter Change . . . . . 200 hours
Oil Filter . . . . . **KOHLER:** MILLER 066 698, Kohler 1205001
ROBIN: MILLER 198 754, Robin 248-65801-00
Oil Capacity w/filter change . Approximately 1.5 quarts
DO NOT OVERFILL . . **KOHLER:** *Keep oil level between L & F marks on dipstick.*
ROBIN: *Keep oil level between **2 holes** on dipstick.*

Gasoline

Fuel Grade . . . . . Unleaded, 87 Octane min.
Fuel Filter . . . . . **KOHLER:** MILLER 215 984, Kohler 2505008
ROBIN: MILLER 215 984, Robin 263-65012-A3

Air Filter Service . . . . . 100 hours – see Owner's Manual
Air Filter . . . . . **KOHLER:** MILLER 067 272, Kohler 4708303
Air Filter Wrapper . . . . . **KOHLER:** MILLER 067 273, Kohler 2408302
Air Filter . . . . . **ROBIN:** MILLER 198 755, Robin 263-32610-A1
(Includes Air Filter Wrapper)

12 Volt Battery . . . . . BCI Group 58
Cranking Performance at 0°F (-18°C) . . . 430 Amps min.

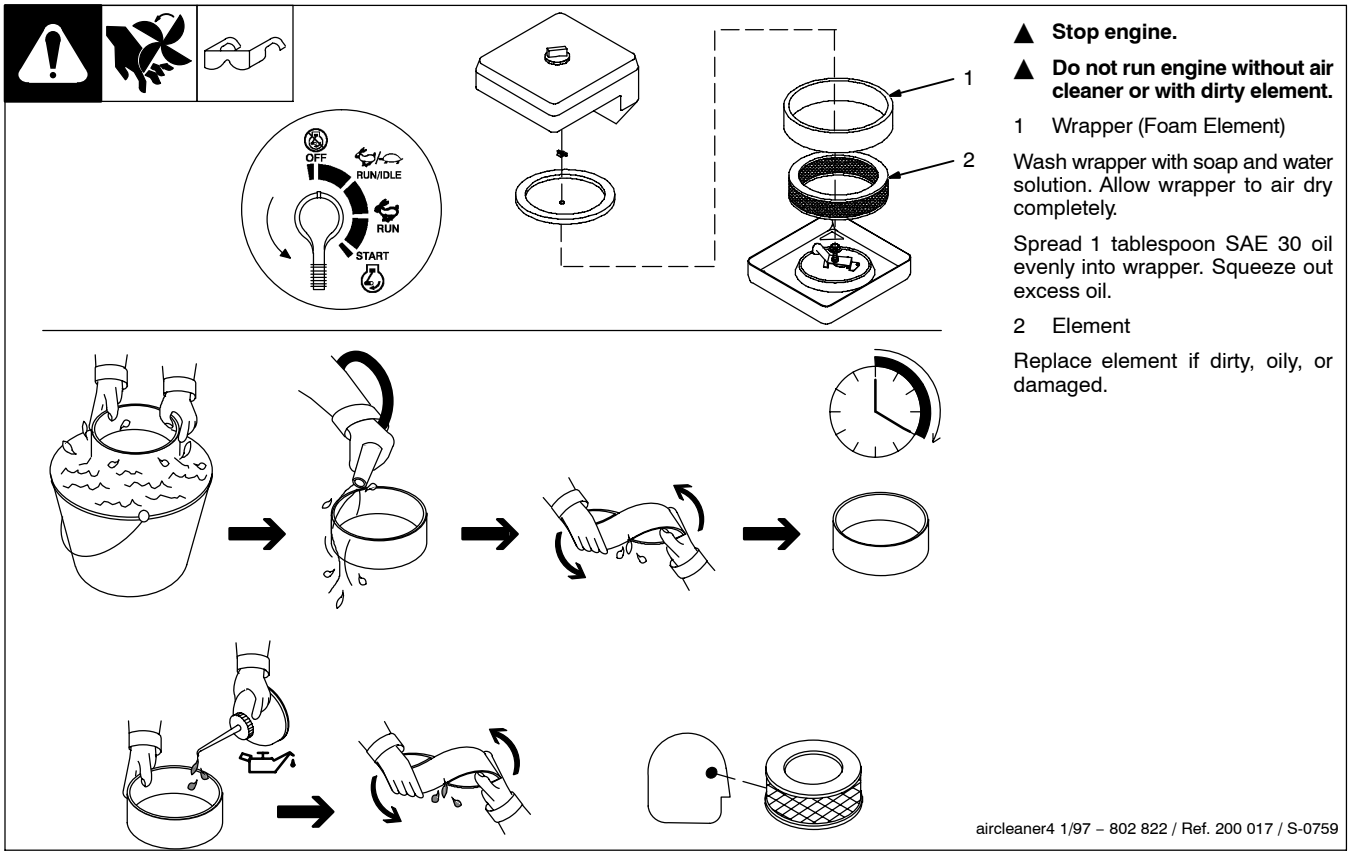
Engine Speed
No Load
High Speed . . . 3675-3750 RPM
Idle . . . . . 2200-2300 RPM
Miller Legend. . See Owner's Manual

Spark Plug . . . . . **KOHLER:** MILLER 067 007, Kohler 1213202, Champion RC-12YC
Gap: 0.030 in.
ROBIN: MILLER 198 777, Robin X65-01407-30, NGK BPR4EY
Use only resistor spark plugs and wires.

Tune-up and Filter Kit . . (Includes Air, Oil and Fuel Filters, and 2 Spark Plugs)
KOHLER: MILLER 180 096
ROBIN: MILLER 199 062

215 939-C

8-3. Servicing Air Cleaner



▲ **Stop engine.**

▲ **Do not run engine without air cleaner or with dirty element.**

1 Wrapper (Foam Element)

Wash wrapper with soap and water solution. Allow wrapper to air dry completely.

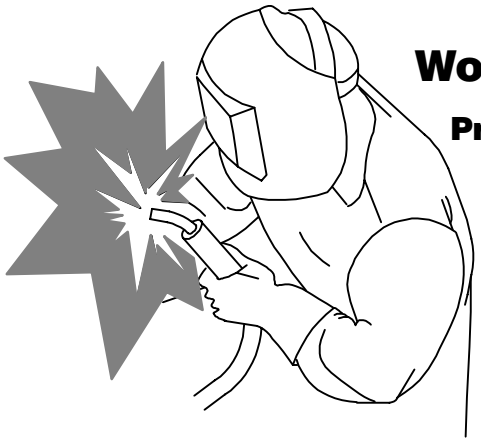
Spread 1 tablespoon SAE 30 oil evenly into wrapper. Squeeze out excess oil.

2 Element

Replace element if dirty, oily, or damaged.

aircleaner4 1/97 – 802 822 / Ref. 200 017 / S-0759

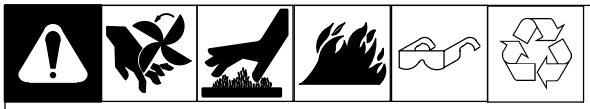
Notes

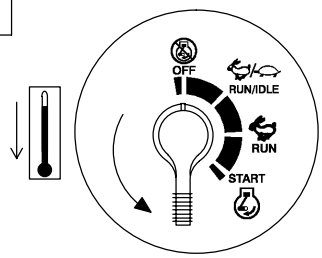


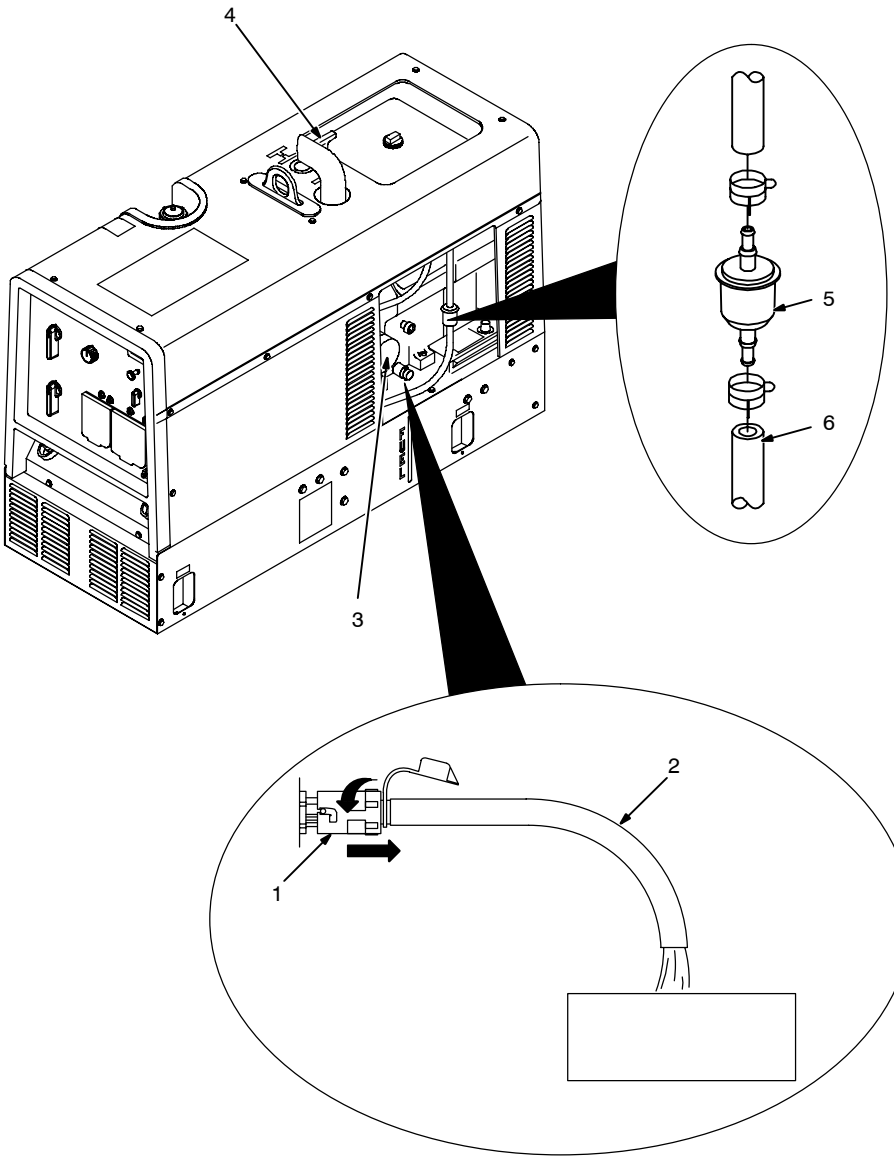
Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.

8-4. Changing Engine Oil, Oil Filter, and Fuel Filter







▲ **Stop engine and let cool.**

1 Oil Drain Valve

2 1/2 ID x 12 in Hose

3 Oil Filter

4 Oil Fill Cap/Dipstick

Change engine oil and filter according to engine owner's manual.

▲ **Close valve and valve cap before adding oil and running engine.**

Fill crankcase with new oil to full mark on dipstick (see Section 8-2).

5 Fuel Filter

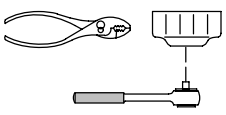
6 Fuel Line

Replace line if cracked or worn. Install new filter. Wipe up any spilled fuel.

Start engine, and check for fuel leaks.

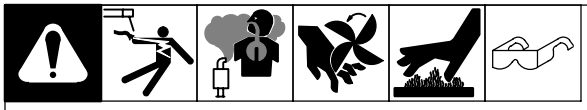
▲ **Stop engine, tighten connections as necessary, and wipe up fuel.**

Tools Needed:

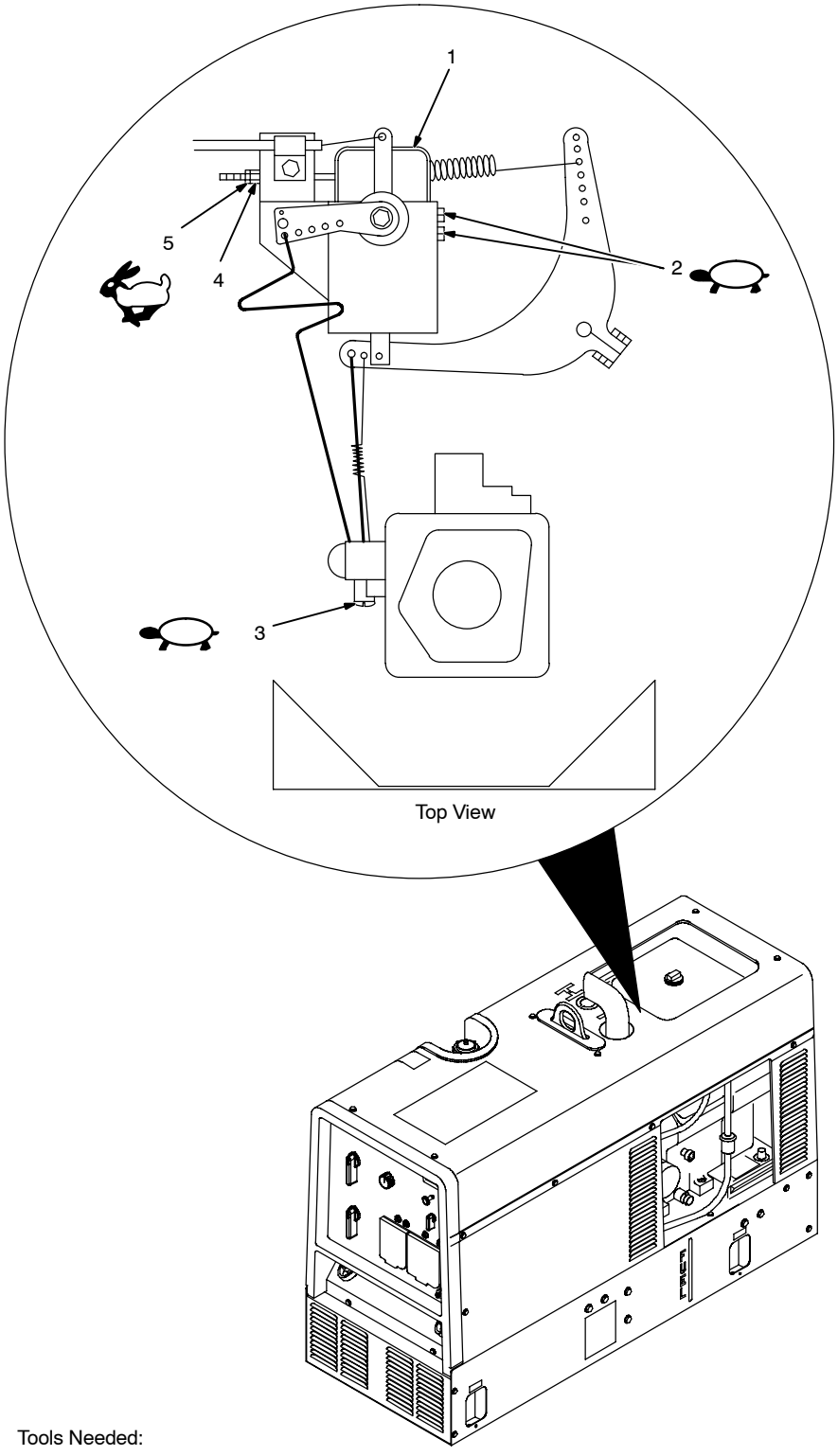


Ref. 801 188-E / Ref. 183 175-A / 800 395 / S-0842

8-5. Adjusting Engine Speed



	2200 ± 50 rpm
	3700 ± 50 rpm



After tuning engine, check engine speeds with a tachometer (see table). If necessary, adjust speeds as follows:

Start engine and run until warm. Turn Fine Control to 10.

Remove top cover to access speed adjustments.

Idle Speed Adjustment

Move Engine Control switch to Run/Idle position.

1 Throttle Solenoid

2 Mounting Screws

3 Idle Speed Screw

Loosen mounting screws. Adjust solenoid position so engine runs at idle speed. If necessary, back out idle speed screw so solenoid can be moved to correct position. Tighten mounting screws. Be sure solenoid linkage works smoothly.

Turn idle speed screw for fine adjustments.

Weld/Power Speed Adjustment

Move Engine Control switch to Run position.

4 Weld/Power Speed Adjustment Nut

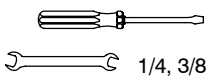
5 Lock Nut

Loosen lock nut. Turn adjustment nut until engine runs at weld/power speed. Tighten lock nut.

Reinstall top cover.

▲ **Stop engine.**

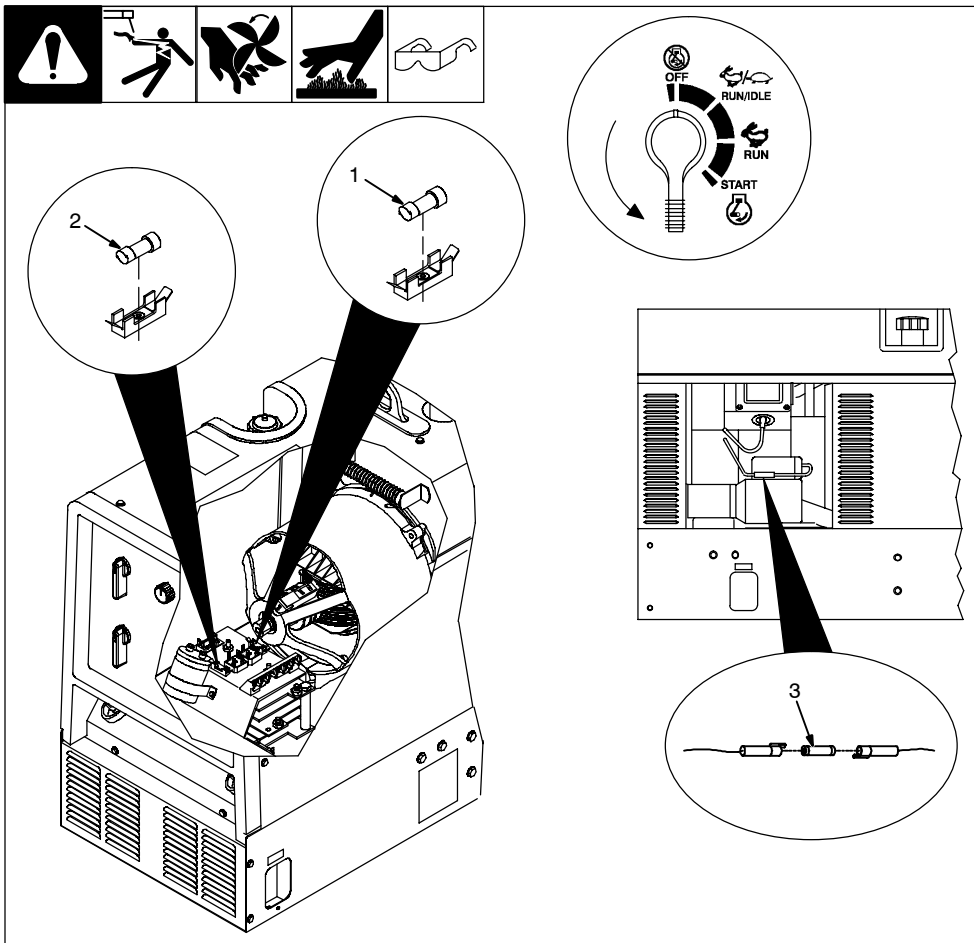
Tools Needed:



1/4, 3/8 in

Ref. 801 188-E / 801 209-A

8-6. Overload Protection



▲ **Stop engine. Disconnect negative (–) battery cable.**

1 Fuse F1 (See Parts List)

F1 protects the weld excitation winding from overload. If F1 opens, weld output stops or is low.

2 Fuse F2 (See Parts List)

F2 protects the generator power excitation winding from overload. If F2 opens, generator power output stops or is low.

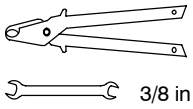
3 Fuse F6 (See Parts List)

F6 protects the engine wiring harness. If F6 opens, the engine does not crank. If F6 opens while engine is running, weld and generator power output stops.

Replace any open fuses. Reinstall panel before operating unit.

☞ *If a fuse opens, it usually indicates a more serious problem exists. Contact a Factory Authorized Service Agent.*

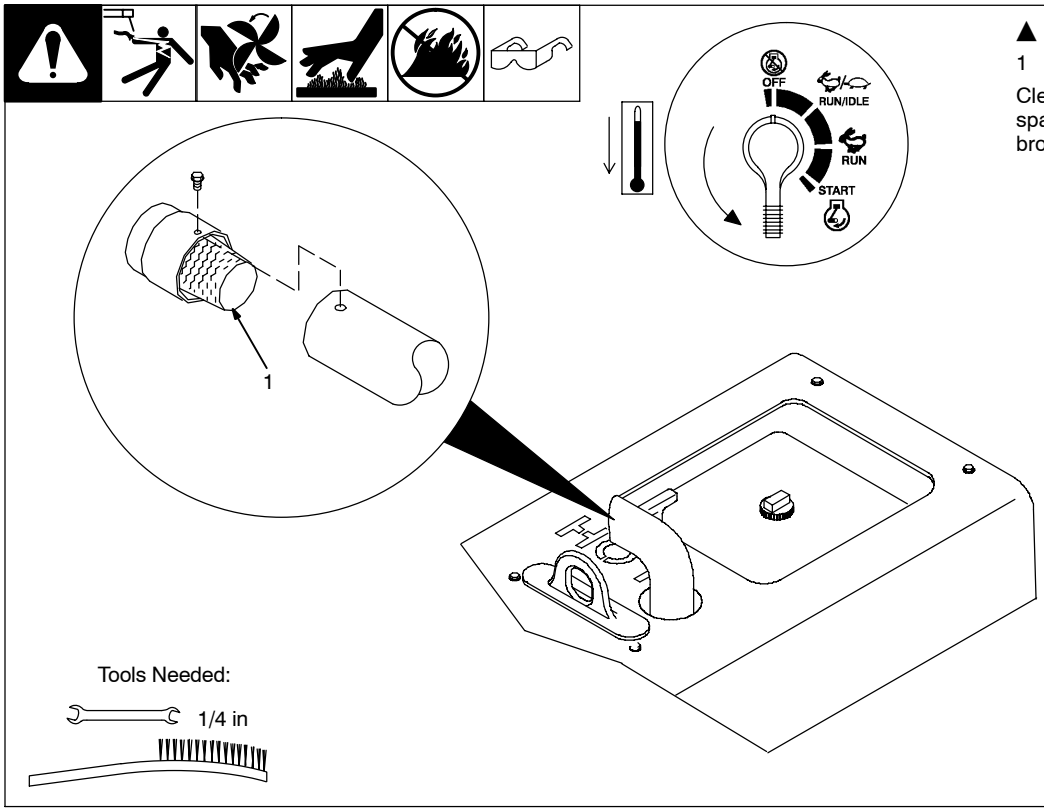
Tools Needed:



3/8 in

801 226-G / Ref. 801 221-A / Ref. 183 175–A

8-7. Servicing Optional Spark Arrestor



▲ **Stop engine and let cool.**

1 Spark Arrestor Screen

Clean and inspect screen. Replace spark arrestor if screen wires are broken or missing.

Tools Needed:

1/4 in

Ref. 801 188 / Ref. 183 175-A

SECTION 9 – TROUBLESHOOTING

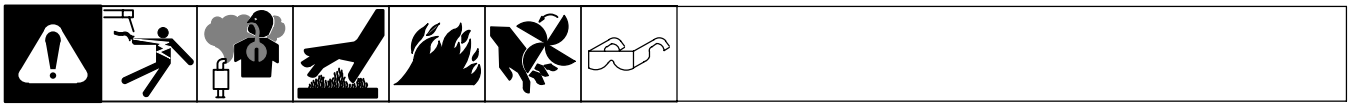
9-1. Welding Troubleshooting

Trouble	Remedy
No weld output.	Check control settings (see Section 6).
	Check weld connections.
	Check fuse F1 and replace if open (see Section 8-6).
	Be sure all equipment is disconnected from receptacles when starting unit.
	Have Factory Authorized Service Agent check brushes, slip rings, and integrated rectifier SR2.
	Check plug PLG6 connection.
Low weld output.	Check fuse F1 and replace if open (see Section 8-6).
	Check control settings.
	Check and adjust engine speed (see Section 8-5).
	Service air cleaner according to engine manual.
	Have Factory Authorized Service Agent check brushes and slip rings.
High weld output.	Check control settings.
	Check and adjust engine speed (see Section 8-5).
Erratic weld output.	Check control settings.
	Tighten and clean connections to electrode and workpiece.
	Use dry, properly-stored electrodes for Stick and TIG welding.
	Remove excessive coils from weld cables.
	Clean and tighten connections both inside and outside welding generator.
	Check and adjust engine speed (see Section 8-5).
	Have Factory Authorized Service Agent check brushes and slip rings.

9-2. Generator Power Troubleshooting

Trouble	Remedy
No output at generator ac receptacles.	Reset circuit breakers (see Section 7-1 or 7-2).
	Press optional GFCI receptacle Reset button (see Section 7-2).
	Check fuse F2 and replace if open (see Section 8-6).
	Check plug PLG6 connection.
	Have Factory Authorized Service Agent check brushes, slip rings, and integrated rectifier SR2.
High output at generator ac receptacles.	Check and adjust engine speed (see Section 8-5).
Low output at generator ac receptacles.	Check fuse F2 and replace if open (see Section 8-6).
	Increase Fine Control R1 setting.
Erratic output at generator ac receptacles.	Check fuel level.
	Check and adjust engine speed (see Section 8-5).
	Check receptacle wiring and connections.
	Have Factory Authorized Service Agent check brushes and slip rings.

9-3. Engine Troubleshooting



Trouble	Remedy
Engine will not crank.	Check fuse F6, and replace if open (see Section 8-6).
	Check battery voltage.
	Check battery connections and tighten if necessary.
	Check plug PLG4 and plug PLG8 connections.
	Have Factory Authorized Service Agent check Engine Control switch S2.
Engine will not start.	Check fuel level.
	Check battery voltage.
	Check battery connections and tighten if necessary.
	Check oil level (see Section 5-2).
	Check low oil pressure shutdown switch (see Parts List for location).
	Have Factory Authorized Service Agent check fuel shutoff solenoid FS1 .
Engine starts but stops when Engine Control switch returns to Run position.	Check oil level.
	Check and refill crankcase with proper viscosity oil for operating temperature, if necessary.
	Check low oil pressure shutdown switch (see Parts List for location).
Engine stopped during normal operation.	Check fuel level.
	Check oil level (see Section 5-2).
	Check low oil pressure shutdown switch (see Parts List for location)
	Periodically recharge battery (approximately every 3 months).
	Replace battery.
	Check voltage regulator and connections according to engine manual.
	Have Factory Authorized Service Agent check fuel shutoff solenoid FS1.
Battery Discharges between uses.	Clean battery, terminals, and posts with baking soda and water solution; rinse with clear water.
	Periodically recharge battery (approximately every 3 months).
	Replace battery.
	Check voltage regulator and connections according to engine manual.
Engine idles but does not come up to weld speed.	Have Factory Authorized Service Agent check auto idle module PC1, and current transformer CT1.
Unstable or sluggish engine speeds.	Readjust throttle linkage if necessary. Check throttle solenoid TS1 for smooth operation.
	Check oil level. Oil level should not exceed Full mark on dipstick. Fuel pump will operate erratically if crankcase is overfilled.
	Tune-up engine according to engine manual.
Engine does not return to idle speed.	Remove weld and generator power loads.
	Check throttle linkage for smooth, non-binding operation.
	Have Factory Authorized Service Agent check idle module PC1, current transformer CT1, Engine Control switch S2, and throttle solenoid TS1.

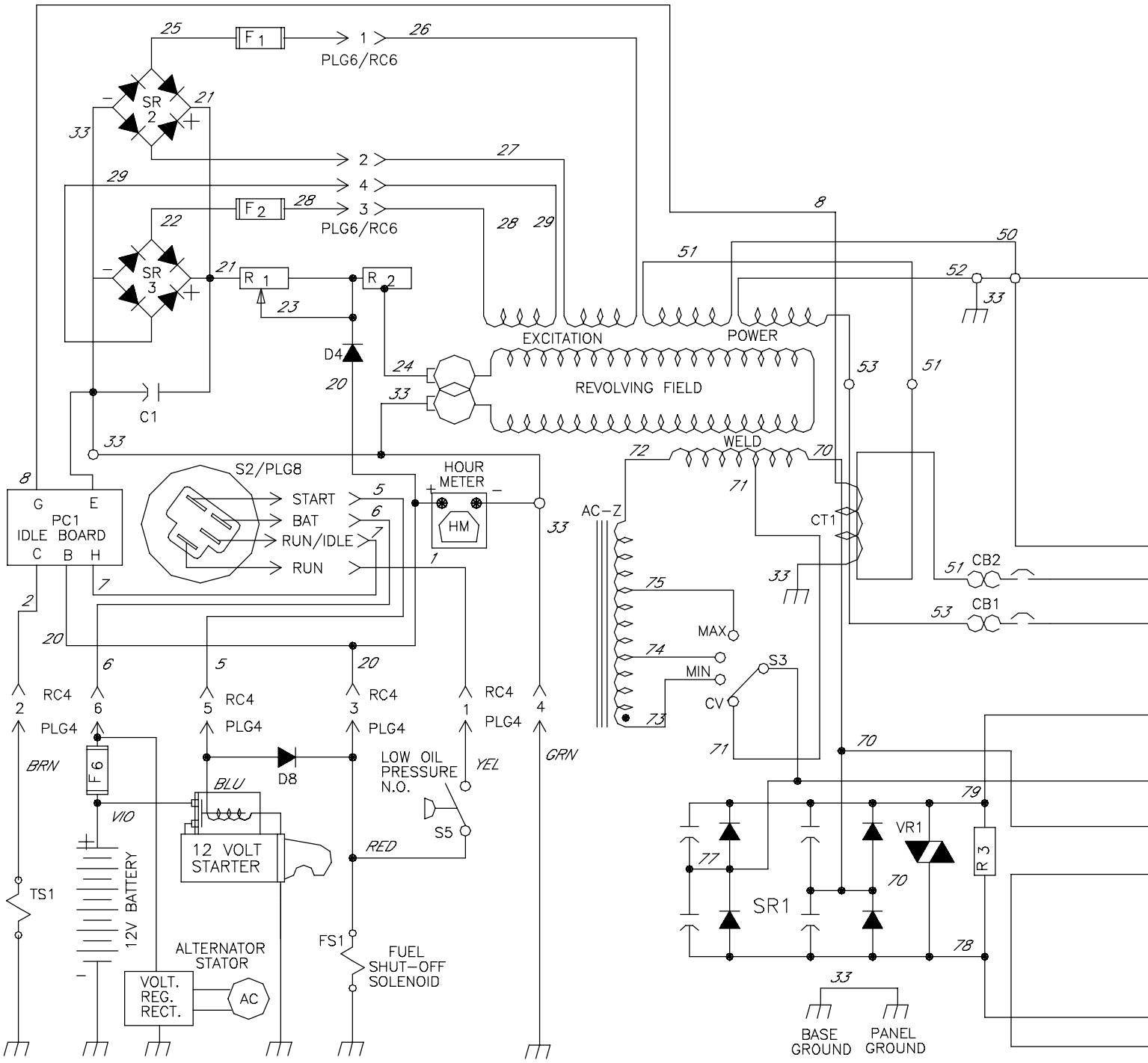
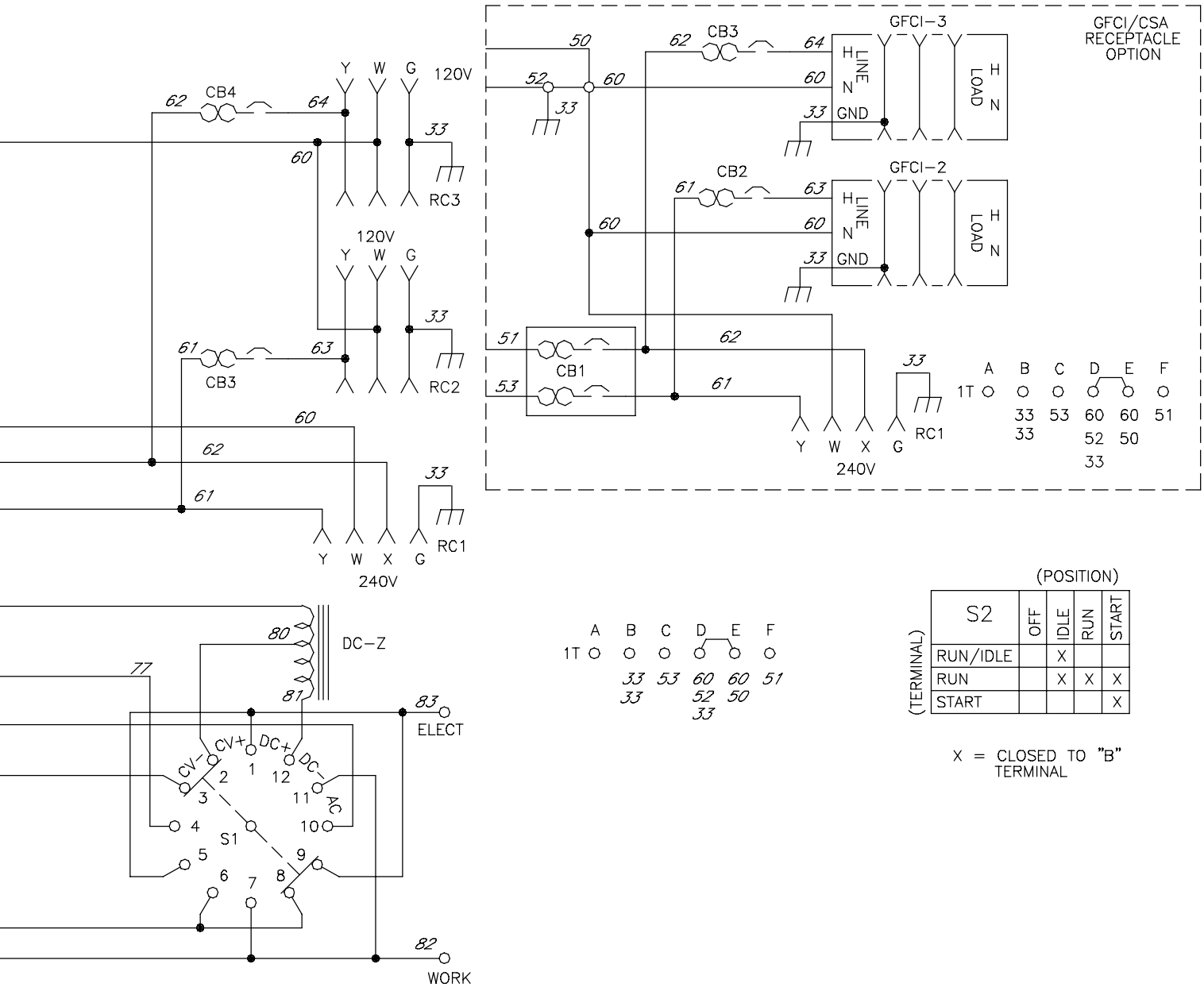


Figure 10-1. Circuit Diagram For Welding Generator



(POSITION)					
(TERMINAL)	S2	OFF	IDLE	RUN	START
	RUN/IDLE		X		
	RUN		X	X	X
	START				X

X = CLOSED TO "B" TERMINAL

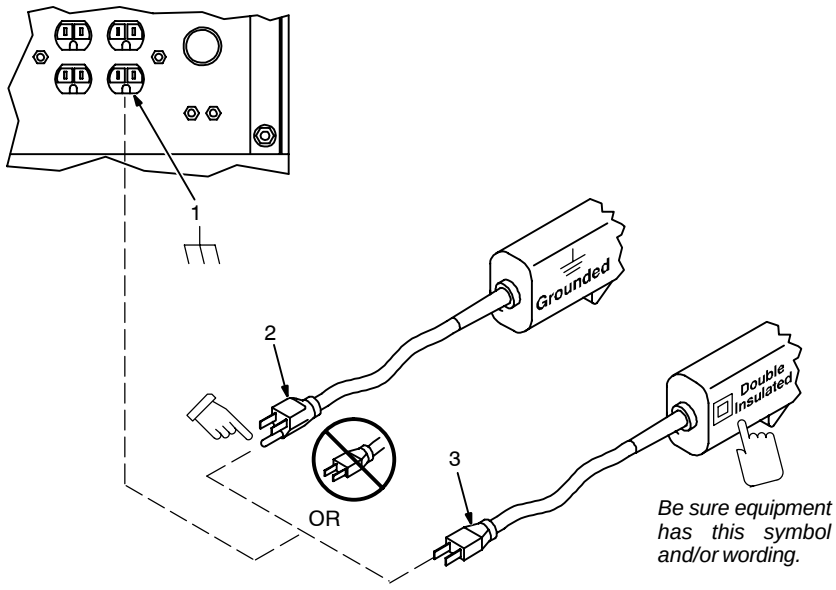
⚠ WARNING — **ELECTRIC SHOCK HAZARD**

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

SECTION 11 – GENERATOR POWER GUIDELINES

NOTE ☞ *The views in this section are intended to be representative of all engine-driven welding generators. Your unit may differ from those shown.*

11-1. Selecting Equipment



Be sure equipment has this symbol and/or wording.

1 Generator Power Receptacles – Neutral Bonded To Frame

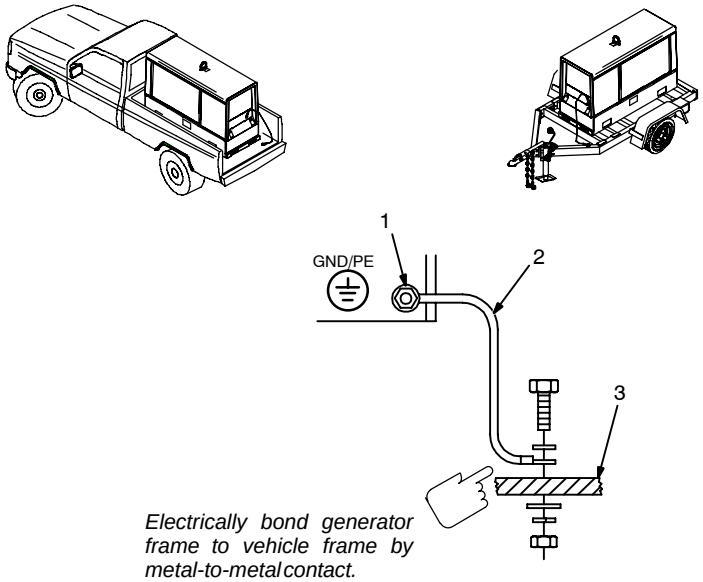
2 3-Prong Plug From Case Grounded Equipment

3 2-Prong Plug From Double Insulated Equipment

▲ **Do not use 2-prong plug unless equipment is double insulated.**

gen_pwr 11/02 – Ref. ST-159 730 / ST-800 577

11-2. Grounding Generator To Truck Or Trailer Frame



Electrically bond generator frame to vehicle frame by metal-to-metal contact.

▲ **Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.**

1 Equipment Grounding Terminal (On Front Panel)

2 Grounding Cable (Not Supplied)

3 Metal Vehicle Frame

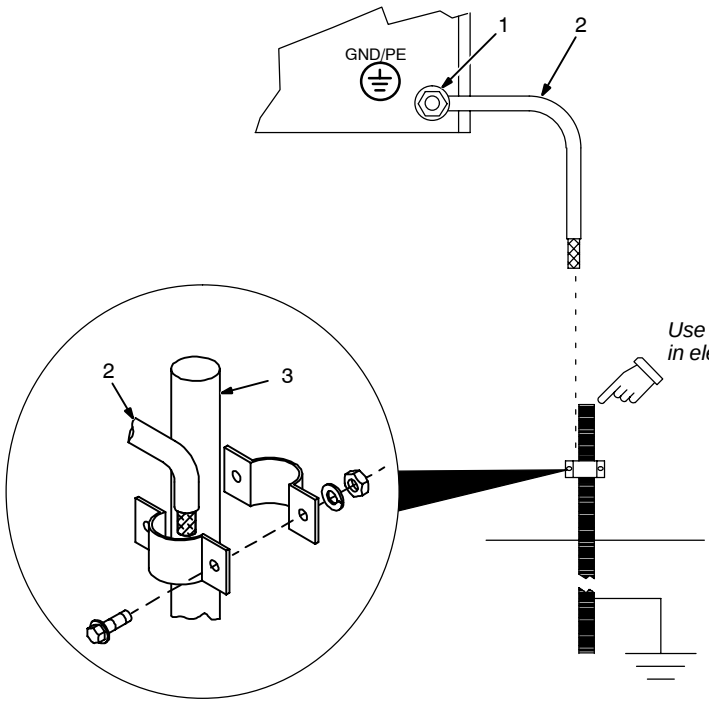
Connect cable from equipment ground terminal to metal vehicle frame. Use #10 AWG or larger insulated copper wire.

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

▲ **Bed liners, shipping skids, and some running gear insulate the welding generator from the vehicle frame. Always connect a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.**

S-0854

11-3. Grounding When Supplying Building Systems



1 Equipment Grounding Terminal

2 Grounding Cable

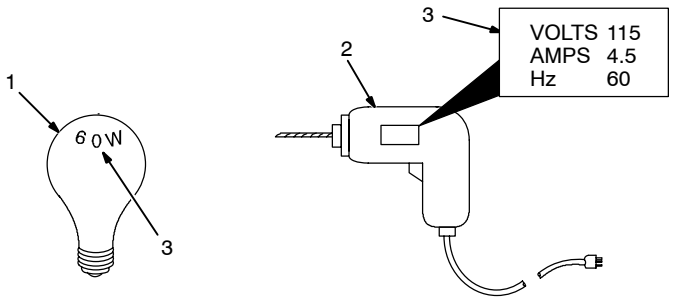
Use #10 AWG or larger insulated copper wire.

3 Ground Device

▲ **Ground generator to system earth ground if supplying power to a premises (home, shop, farm) wiring system.**

ST-800 576-B

11-4. How Much Power Does Equipment Require?



1 Resistive Load

A light bulb is a resistive load and requires a constant amount of power.

2 Non-Resistive Load

Equipment with a motor is a non-resistive load and requires approximately six times more power while starting the motor than when running (see Section 11-8).

3 Rating Data

Rating shows volts and amperes, or watts required to run equipment.

AMPERES x VOLTS = WATTS

EXAMPLE 1: If a drill uses 4.5 amperes at 115 volts, calculate its running power requirement in watts.

4.5 A x 115 V = 520 W

The load applied by the drill is 520 watts.

EXAMPLE 2: If three 200 watt flood lamps are used with the drill from Example 1, add the individual loads to calculate total load.

(200 W + 200 W + 200 W) + 520 W = 1120 W

The total load applied by the three flood lamps and drill is 1120 watts.

S-0623

11-5. Approximate Power Requirements For Industrial Motors

Industrial Motors	Rating	Starting Watts	Running Watts
Split Phase	1/8 HP	800	300
	1/6 HP	1225	500
	1/4 HP	1600	600
	1/3 HP	2100	700
	1/2 HP	3175	875
Capacitor Start-Induction Run	1/3 HP	2020	720
	1/2 HP	3075	975
	3/4 HP	4500	1400
	1 HP	6100	1600
	1-1/2 HP	8200	2200
	2 HP	10550	2850
	3 HP	15900	3900
	5 HP	23300	6800
Capacitor Start-Capacitor Run	1-1/2 HP	8100	2000
	5 HP	23300	6000
	7-1/2 HP	35000	8000
	10 HP	46700	10700
Fan Duty	1/8 HP	1000	400
	1/6 HP	1400	550
	1/4 HP	1850	650
	1/3 HP	2400	800
	1/2 HP	3500	1100

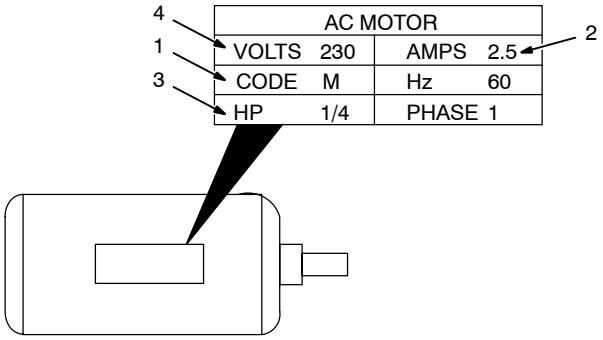
11-6. Approximate Power Requirements For Farm/Home Equipment

Farm/Home Equipment	Rating	Starting Watts	Running Watts
Stock Tank De-Icer		1000	1000
Grain Cleaner	1/4 HP	1650	650
Portable Conveyor	1/2 HP	3400	1000
Grain Elevator	3/4 HP	4400	1400
Milk Cooler		2900	1100
Milker (Vacuum Pump)	2 HP	10500	2800
FARM DUTY MOTORS	1/3 HP	1720	720
Std. (e.g. Conveyors,	1/2 HP	2575	975
Feed Augers, Air	3/4 HP	4500	1400
Compressors)	1 HP	6100	1600
	1-1/2 HP	8200	2200
	2 HP	10550	2850
	3 HP	15900	3900
	5 HP	23300	6800
High Torque (e.g. Barn	1-1/2 HP	8100	2000
Cleaners, Silo Unloaders,	5 HP	23300	6000
Silo Hoists, Bunk Feeders)	7-1/2 HP	35000	8000
	10 HP	46700	10700
3-1/2 cu. ft. Mixer	1/2 HP	3300	1000
High Pressure 1.8 Gal/Min	500 PSI	3150	950
Washer 2 gal/min	550 PSI	4500	1400
2 gal/min	700 PSI	6100	1600
Refrigerator or Freezer		3100	800
Shallow Well Pump	1/3 HP	2150	750
	1/2 HP	3100	1000
Sump Pump	1/3 HP	2100	800
	1/2 HP	3200	1050

11-7. Approximate Power Requirements For Contractor Equipment

Contractor	Rating	Starting Watts	Running Watts
Hand Drill	1/4 in	350	350
	3/8 in	400	400
	1/2 in	600	600
Circular Saw	6-1/2 in	500	500
	7-1/4 in	900	900
	8-1/4 in	1400	1400
Table Saw	9 in	4500	1500
	10 in	6300	1800
Band Saw	14 in	2500	1100
Bench Grinder	6 in	1720	720
	8 in	3900	1400
	10 in	5200	1600
Air Compressor	1/2 HP	3000	1000
	1 HP	6000	1500
	1-1/2 HP	8200	2200
	2 HP	10500	2800
Electric Chain Saw	1-1/2 HP, 12 in	1100	1100
	2 HP, 14 in	1100	1100
Electric Trimmer	Standard 9 in	350	350
	Heavy Duty 12 in	500	500
Electric Cultivator	1/3 HP	2100	700
Elec. Hedge Trimmer	18 in	400	400
Flood Lights	HID	125	100
	Metal Halide	313	250
	Mercury	1000	
	Sodium	1400	
	Vapor	1250	1000
Submersible Pump	400 gph	600	200
Centrifugal Pump	900 gph	900	500
Floor Polisher	3/4 HP, 16 in	4500	1400
	1 HP, 20 in	6100	1600
High Pressure Washer	1/2 HP	3150	950
	3/4 HP	4500	1400
	1 HP	6100	1600
55 gal Drum Mixer	1/4 HP	1900	700
Wet & Dry Vac	1.7 HP	900	900
	2-1/2 HP	1300	1300

11-8. Power Required To Start Motor



1 Motor Start Code
2 Running Amperage
3 Motor HP
4 Motor Voltage

To find starting amperage:

Step 1: Find code and use table to find kVA/HP. If code is not listed, multiply running amperage by six to find starting amperage.

Step 2: Find Motor HP and Volts.

Step 3: Determine starting amperage (see example).

Welding generator amperage output must be at least twice the motor's running amperage.

Single-Phase Induction Motor Starting Requirements

Motor Start Code	G	H	J	K	L	M	N	P
KVA/HP	6.3	7.1	8.0	9.0	10.0	11.2	12.5	14.0

$$\frac{\textbf{kVA/HP x HP x 1000}}{\textbf{VOLTS}} = \textbf{STARTING AMPERAGE}$$

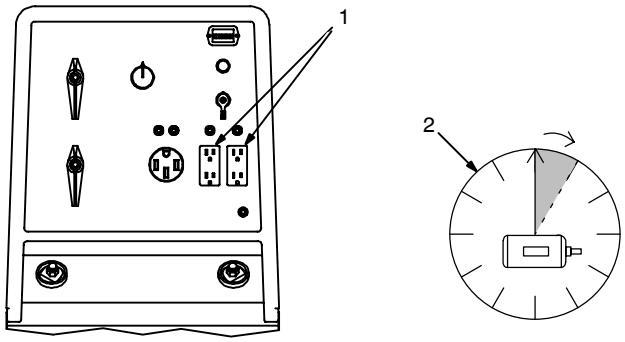
EXAMPLE: Calculate the starting amperage required for a 230 V, 1/4 HP motor with a motor start code of M.

Volts = 230 HP = 1/4 Using Table, Code M results in kVA/HP = 11.2

$$\frac{11.2 \times 1/4 \times 1000}{230} = 12.2\ \text{A}$$ **Starting the motor requires 12.2 amperes.**

S-0624

11-9. How Much Power Can Generator Supply?



1 Limit Load To 90% Of Generator Output

Always start non-resistive (motor) loads in order from largest to smallest, and add resistive loads last.

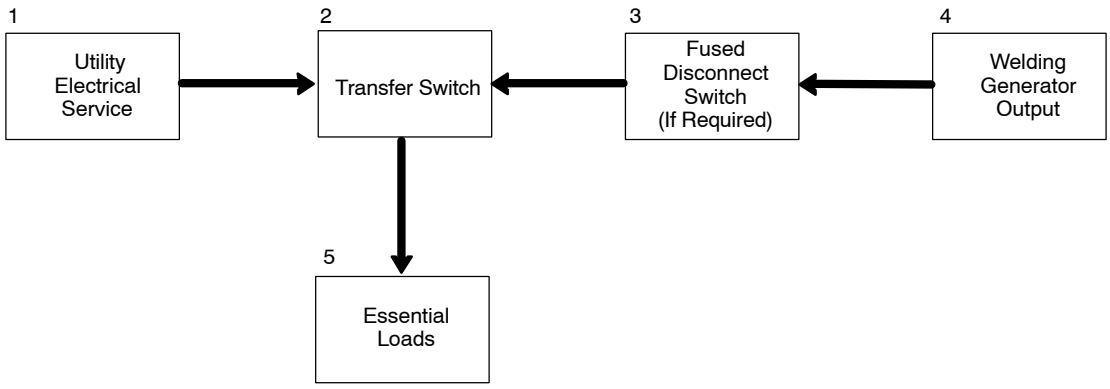
2 5 Second Rule

If motor does not start within 5 seconds, turn off power to prevent motor damage. Motor requires more power than generator can supply.

Ref. ST-800 396-A / S-0625

11-10. Typical Connections To Supply Standby Power

▲ **Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.**



▲ **Have only qualified persons perform these connections according to all applicable codes and safety practices.**

▲ **Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.**

☞ *Customer-supplied equipment is required if generator will supply standby power during emergencies or power outages.*

1 Utility Electrical Service

2 Transfer Switch (Double-Throw)

Switch transfers the electrical load from electric utility service to the generator. Transfer load back to electric utility when service is restored.

Install correct switch (customer-supplied). Switch rating must be same as or greater than the branch overcurrent protection.

3 Fused Disconnect Switch

Install correct switch (customer-supplied) if required by electrical code.

4 Welding Generator Output

Generator output voltage and wiring must be consistent with regular (utility) system voltage and wiring.

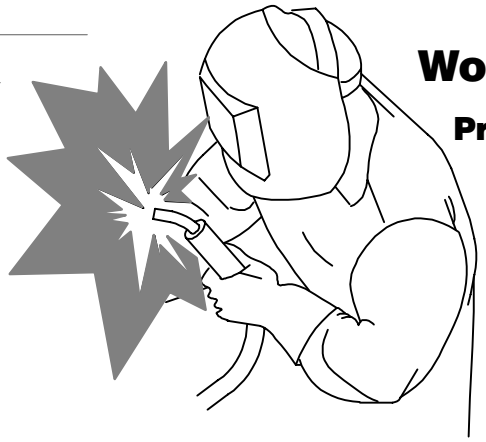
Connect generator with temporary or permanent wiring suitable for the installation.

Turn off or unplug all equipment connected to generator before starting or stopping engine. When starting or stopping, the engine has low speed which causes low voltage and frequency.

5 Essential Loads

Generator output may not meet the electrical requirements of the premises. If generator does not produce enough output to meet all requirements, connect only essential loads (pumps, freezers, heaters, etc. – See Section 11-4).

Notes



Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.

11-11. Selecting Extension Cord (Use Shortest Cord Possible)

Cord Lengths for 120 Volt Loads

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*					
		4	6	8	10	12	14
5	600			350 (106)	225 (68)	137 (42)	100 (30)
7	840		400 (122)	250 (76)	150 (46)	100 (30)	62 (19)
10	1200	400 (122)	275 (84)	175 (53)	112 (34)	62 (19)	50 (15)
15	1800	300 (91)	175 (53)	112 (34)	75 (23)	37 (11)	30 (9)
20	2400	225 (68)	137 (42)	87 (26)	50 (15)	30 (9)	
25	3000	175 (53)	112 (34)	62 (19)	37 (11)		
30	3600	150 (46)	87 (26)	50 (15)	37 (11)		
35	4200	125 (38)	75 (23)	50 (15)			
40	4800	112 (34)	62 (19)	37 (11)			
45	5400	100 (30)	62 (19)				
50	6000	87 (26)	50 (15)				

*Conductor size is based on maximum 2% voltage drop

Cord Lengths for 240 Volt Loads

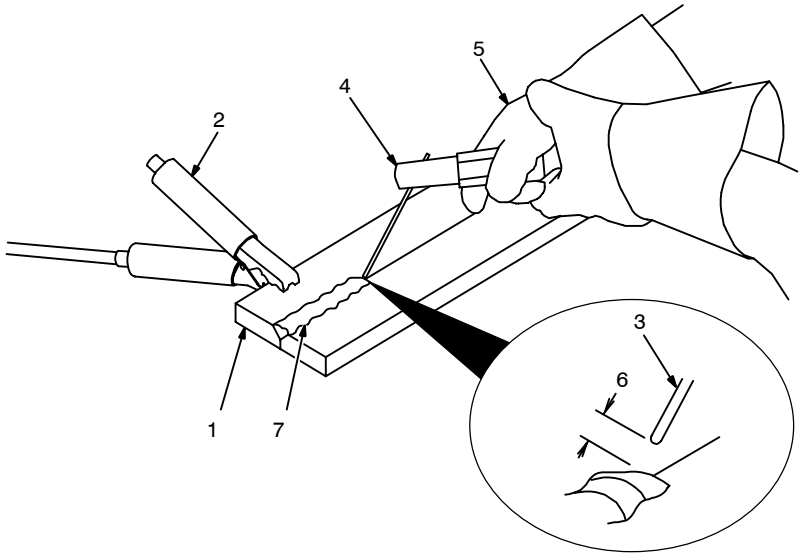
▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*					
		4	6	8	10	12	14
5	1200			700 (213)	450 (137)	225 (84)	200 (61)
7	1680		800 (244)	500 (152)	300 (91)	200 (61)	125 (38)
10	2400	800 (244)	550 (168)	350 (107)	225 (69)	125 (38)	100 (31)
15	3600	600 (183)	350 (107)	225 (69)	150 (46)	75 (23)	60 (18)
20	4800	450 (137)	275 (84)	175 (53)	100 (31)	60 (18)	
25	6000	350 (107)	225 (69)	125 (38)	75 (23)		
30	7000	300 (91)	175 (53)	100 (31)	75 (23)		
35	8400	250 (76)	150 (46)	100 (31)			
40	9600	225 (69)	125 (38)	75 (23)			
45	10,800	200 (61)	125 (38)				
50	12,000	175 (53)	100 (31)				

*Conductor size is based on maximum 2% voltage drop

SECTION 12 – STICK WELDING (SMAW) GUIDELINES

12-1. Stick Welding Procedure



▲ **Weld current starts when electrode touches workpiece.**

▲ **Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.**

1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

3 Electrode

A small diameter electrode requires less current than a large one. Follow electrode manufacturer's instructions when setting weld amperage (see Section 12-2).

4 Insulated Electrode Holder

5 Electrode Holder Position

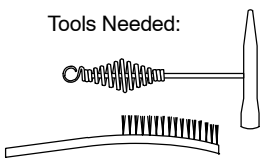
6 Arc Length

Arc length is the distance from the electrode to the workpiece. A short arc with correct amperage will give a sharp, crackling sound.

7 Slag

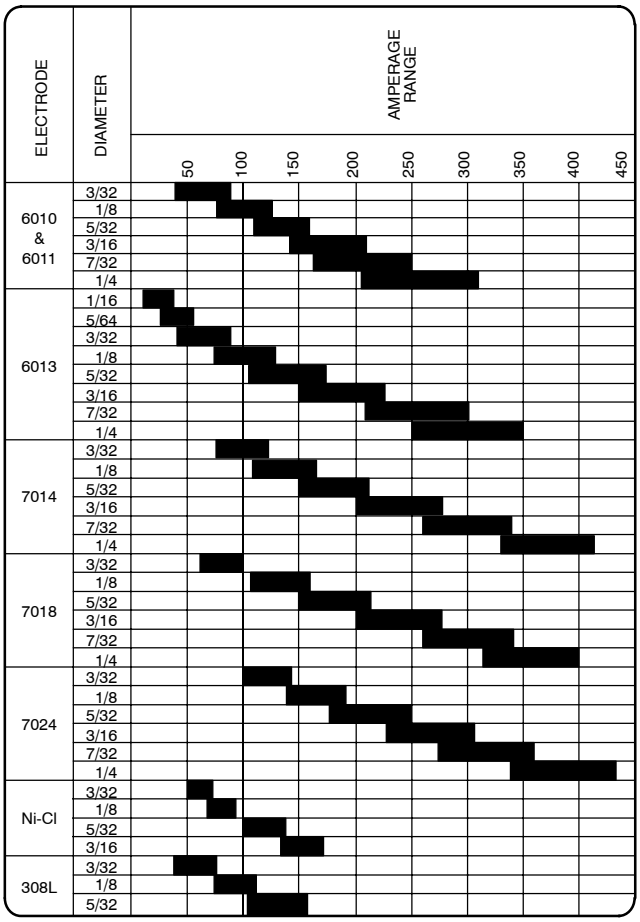
Use a chipping hammer and wire brush to remove slag. Remove slag and check weld bead before making another weld pass.

Tools Needed:



stick 12/96 – ST-151 593

12-2. Electrode and Amperage Selection Chart

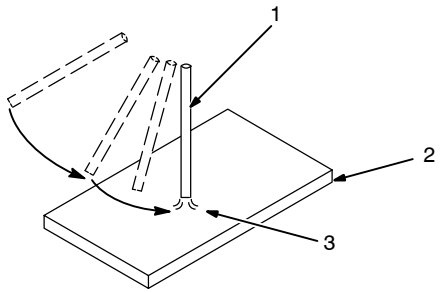


ELECTRODE	DC*	AC	POSITION	PENETRATION	USAGE
6010	EP		ALL	DEEP	MIN. PREP, ROUGH HIGH SPATTER
6011	EP	✓	ALL	DEEP	
6013	EP,EN	✓	ALL	LOW	GENERAL
7014	EP,EN	✓	ALL	MED	SMOOTH, EASY, FAST
7018	EP	✓	ALL	LOW	LOW HYDROGEN, STRONG
7024	EP,EN	✓	FLAT HORIZ FILLET	LOW	SMOOTH, EASY, FASTER
NI-CL	EP	✓	ALL	LOW	CAST IRON
308L	EP	✓	ALL	LOW	STAINLESS

*EP = ELECTRODE POSITIVE (REVERSE POLARITY)
EN = ELECTRODE NEGATIVE (STRAIGHT POLARITY)

Ref. S-087 985-A

12-3. Striking an Arc – Scratch Start Technique

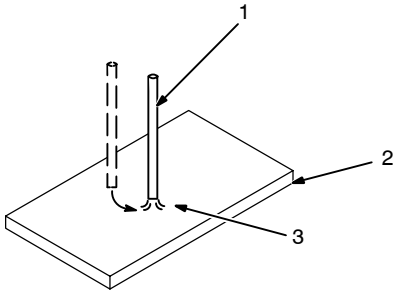


1 Electrode
2 Workpiece
3 Arc

Drag electrode across workpiece like striking a match; lift electrode slightly after touching work. If arc goes out electrode was lifted to high. If electrode sticks to workpiece, use a quick twist to free it.

S-0049

12-4. Striking an Arc – Tapping Technique

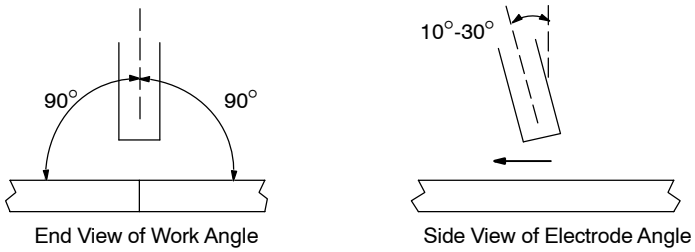


1 Electrode
2 Workpiece
3 Arc

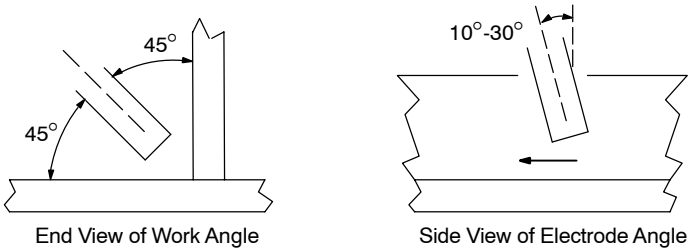
Bring electrode straight down to workpiece; then lift slightly to start arc. If arc goes out, electrode was lifted too high. If electrode sticks to workpiece, use a quick twist to free it.

S-0050

12-5. Positioning Electrode Holder



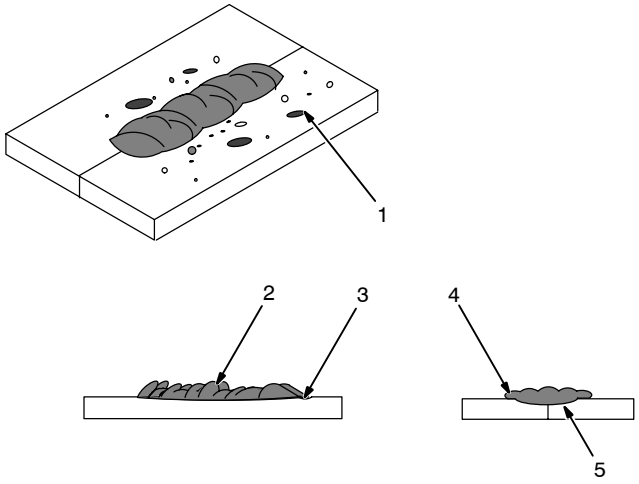
GROOVE WELDS



FILLET WELDS

S-0060

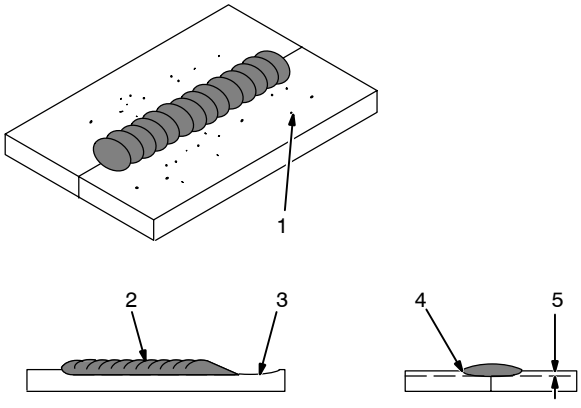
12-6. Poor Weld Bead Characteristics



1 Large Spatter Deposits
2 Rough, Uneven Bead
3 Slight Crater During Welding
4 Bad Overlap
5 Poor Penetration

S-0053-A

12-7. Good Weld Bead Characteristics



1 Fine Spatter
2 Uniform Bead
3 Moderate Crater During Welding

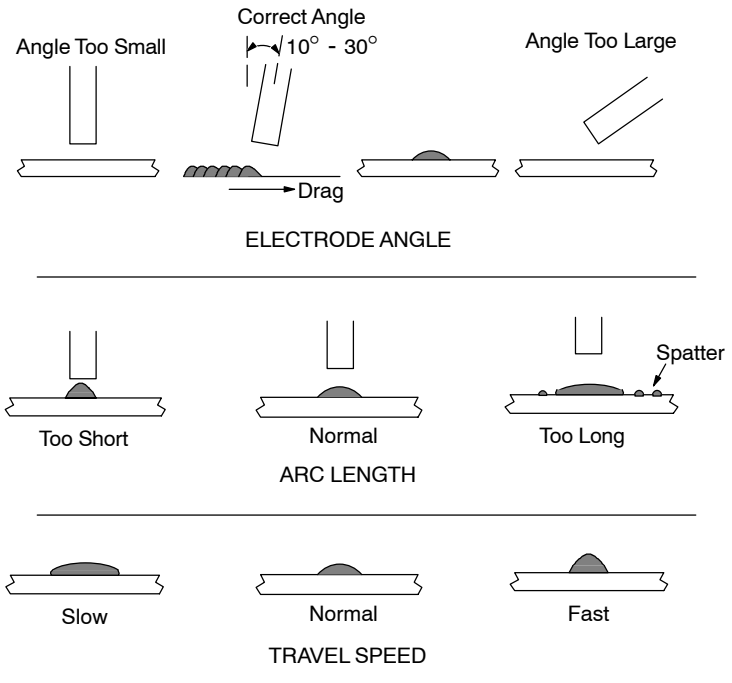
Weld a new bead or layer for each 1/8 in. (3.2 mm) thickness in metals being welded.

4 No Overlap
5 Good Penetration into Base Metal

S-0052-B

12-8. Conditions That Affect Weld Bead Shape

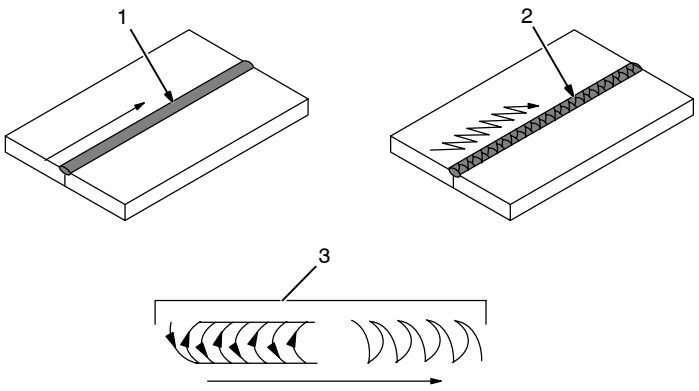
NOTE ☞ *Weld bead shape is affected by electrode angle, arc length, travel speed, and thickness of base metal.*



S-0061

12-9. Electrode Movement During Welding

NOTE ☞ *Normally, a single stringer bead is satisfactory for most narrow groove weld joints; however, for wide groove weld joints or bridging across gaps, a weave bead or multiple stringer beads work better.*



1 Stringer Bead – Steady Movement Along Seam

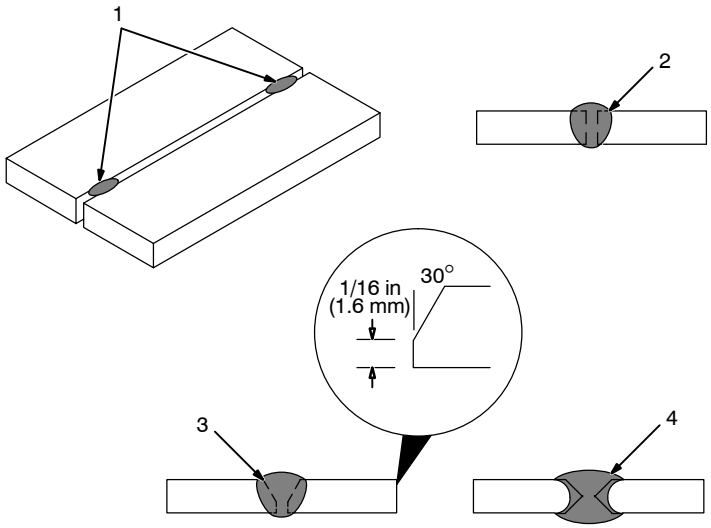
2 Weave Bead – Side to Side Movement Along Seam

3 Weave Patterns

Use weave patterns to cover a wide area in one pass of the electrode. Do not let weave width exceed 2-1/2 times diameter of electrode.

S-0054-A

12-10. Butt Joints



1 Tack Welds

Prevent edges of joint from drawing together ahead of electrode by tack welding the materials in position before final weld.

2 Square Groove Weld

Good for materials up to 3/16 in (5 mm) thick.

3 Single V-Groove Weld

Good for materials 3/16 – 3/4 in (5-19 mm) thick. Cut bevel with oxy-acetylene or plasma cutting equipment. Remove scale from material after cutting. A grinder can also be used to prepare bevels.

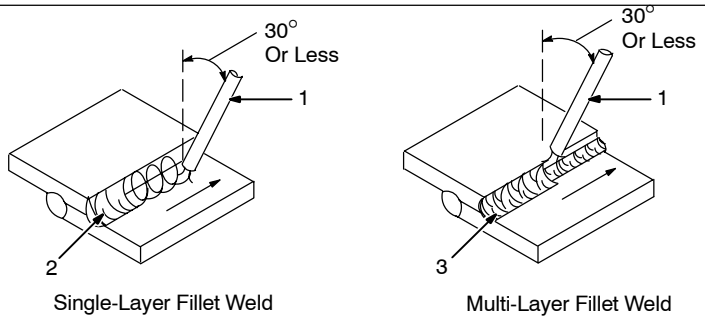
Create 30 degree angle of bevel on materials in V-groove welding.

4 Double V-Groove Weld

Good for materials thicker than 3/16 in (5 mm).

S-0662

12-11. Lap Joint



1 Electrode

2 Single-Layer Fillet Weld

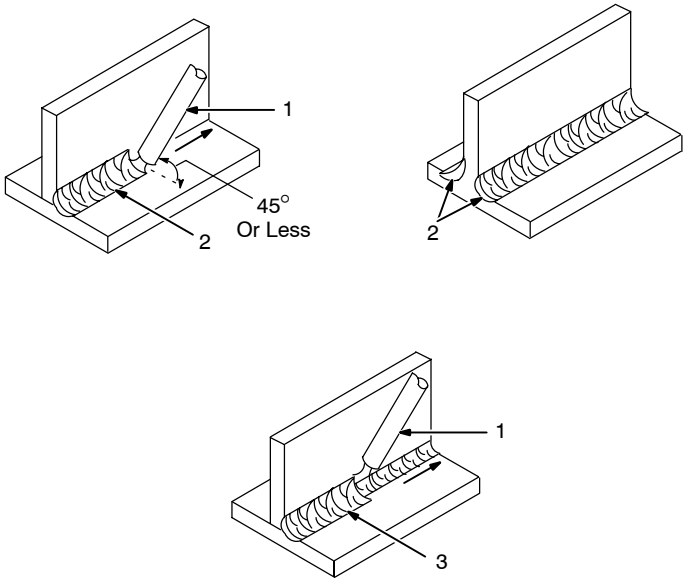
Move electrode in circular motion.

3 Multi-Layer Fillet Weld

Weld a second layer when a heavier fillet is needed. Remove slag before making another weld pass. Weld both sides of joint for maximum strength.

S-0063 / S-0064

12-12. Tee Joint



1 Electrode

2 Fillet Weld

Keep arc short and move at definite rate of speed. Hold electrode as shown to provide fusion into the corner. Square edge of the weld surface.

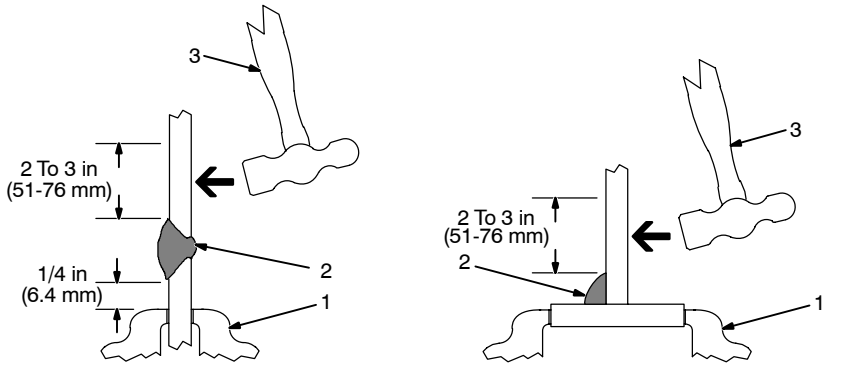
For maximum strength weld both sides of upright section.

3 Multi-Layer Deposits

Weld a second layer when a heavier fillet is needed. Use any of the weaving patterns shown in Section 12-9. Remove slag before making another weld pass.

S-0060 / S-0058-A / S-0061

12-13. Weld Test

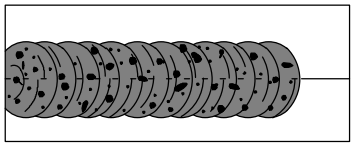


1 Vise
2 Weld Joint
3 Hammer

Strike weld joint in direction shown. A good weld bends over but does not break.

S-0057-B

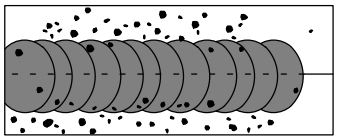
12-14. Troubleshooting – Porosity



Porosity – small cavities or holes resulting from gas pockets in weld metal.

Possible Causes	Corrective Actions
Arc length too long.	Reduce arc length.
Damp electrode.	Use dry electrode.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.

12-15. Troubleshooting – Excessive Spatter



Excessive Spatter – scattering of molten metal particles that cool to solid form near weld bead.

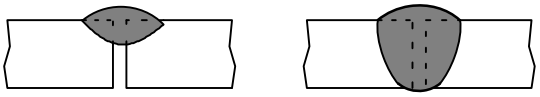
Possible Causes	Corrective Actions
Amperage too high for electrode.	Decrease amperage or select larger electrode.
Arc length too long or voltage too high.	Reduce arc length or voltage.

12-16. Troubleshooting – Incomplete Fusion

Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceeding weld bead.

Possible Causes	Corrective Actions
Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
Improper welding technique.	Place stringer bead in proper location(s) at joint during welding.
	Adjust work angle or widen groove to access bottom during welding.
	Momentarily hold arc on groove side walls when using weaving technique.
	Keep arc on leading edge of weld puddle.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.

12-17. Troubleshooting – Lack Of Penetration

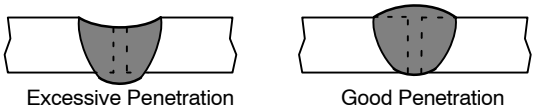


Lack of Penetration Good Penetration

Lack Of Penetration – shallow fusion between weld metal and base metal.

Possible Causes	Corrective Actions
Improper joint preparation.	Material too thick. Joint preparation and design must provide access to bottom of groove.
Improper weld technique.	Keep arc on leading edge of weld puddle.
Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
	Reduce travel speed.

12-18. Troubleshooting – Excessive Penetration

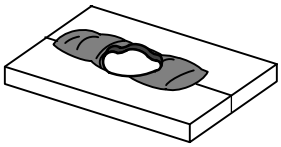


Excessive Penetration Good Penetration

Excessive Penetration – weld metal melting through base metal and hanging underneath weld.

Possible Causes	Corrective Actions
Excessive heat input.	Select lower amperage. Use smaller electrode.
	Increase and/or maintain steady travel speed.

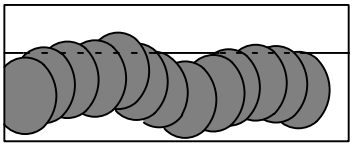
12-19. Troubleshooting – Burn-Through



Burn-Through – weld metal melting completely through base metal resulting in holes where no metal remains.

Possible Causes	Corrective Actions
Excessive heat input.	Select lower amperage. Use smaller electrode.
	Increase and/or maintain steady travel speed.

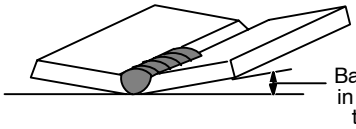
12-20. Troubleshooting – Waviness Of Bead



Waviness Of Bead – weld metal that is not parallel and does not cover joint formed by base metal.

Possible Causes	Corrective Actions
Unsteady hand.	Use two hands. Practice technique.

12-21. Troubleshooting – Distortion

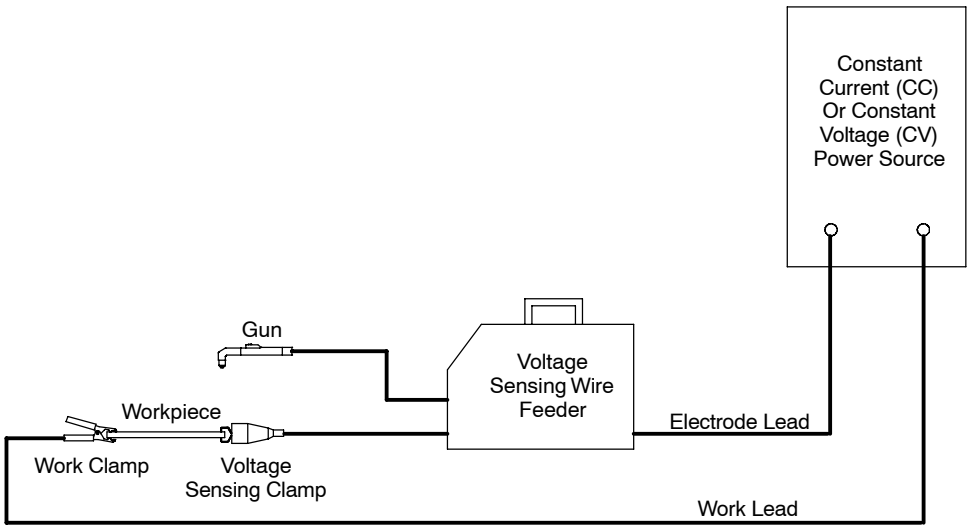


Distortion – contraction of weld metal during welding that forces base metal to move.

Possible Causes	Corrective Actions
Excessive heat input.	Use restraint (clamp) to hold base metal in position.
	Make tack welds along joint before starting welding operation.
	Select lower amperage for electrode.
	Increase travel speed.
	Weld in small segments and allow cooling between welds.

SECTION 13 – MIG WELDING (GMAW) GUIDELINES

13-1. Typical MIG Process Connections Using A Voltage-Sensing Wire Feeder



▲ **Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.**

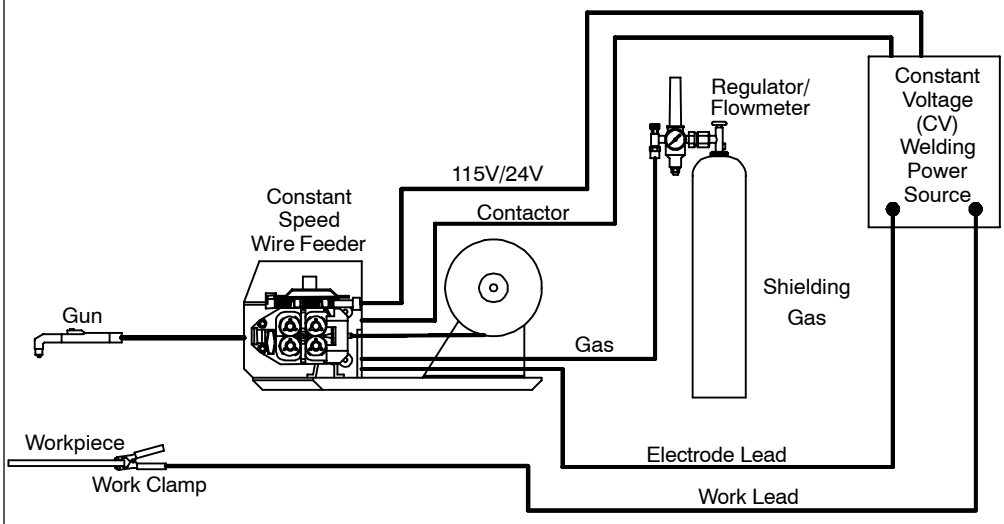
Voltage sensing wire feeders are used with constant current (CC) or constant voltage (CV) power sources (14 pin receptacle not required).

If using a CC or CV welding power source without a weld output contactor, use optional secondary contactor.

For GMAW, use optional gas valve.

802 488

13-2. Typical MIG Process Connections Using A Constant Speed Wire Feeder



▲ **Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.**

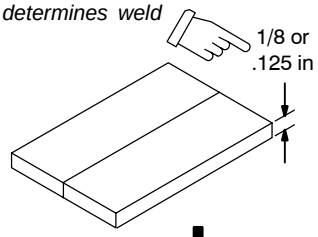
Constant speed wire feeders are used with constant voltage (CV) power sources having a 14-pin receptacle.

mig 9/99 / ST-800 357-A

13-3. Typical MIG Process Control Settings

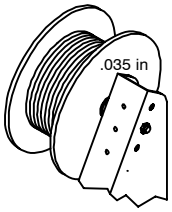
NOTE ☞ *These settings are guidelines only. Material and wire type, joint design, fitup, position, shielding gas, etc. affect settings. Test welds to be sure they comply to specifications.*

Material thickness determines weld parameters.



Convert Material Thickness to Amperage (A)

(.001 in = 1 ampere)
.125 in = 125 A



Wire Size	Amperage Range
.030 in	40 – 145 A
.035 in	50 – 180 A
.045 in	75 – 250 A

Select Wire Size

Wire Size	Recommendation	Wire Speed (Approx.)
.030 in	2 in per ampere	2 x 125 A = 250 ipm
.035 in	1.6 in per ampere	1.6 x 125 A = 200 ipm
.045 in	1 in per ampere	1 x 125 A = 125 ipm

Select Wire Speed (Amperage)

125 A based on 1/8 in material thickness

ipm = inch per minute

Low voltage: wire stubs into work

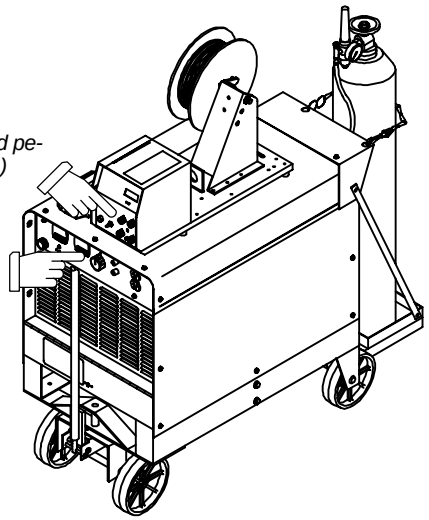
High voltage: arc is unstable (spatter)

Set voltage midway between high/low voltage.

Select Voltage

Wire speed (amperage) controls weld penetration (wire speed = burn-off rate)

Voltage controls height and width of weld bead.

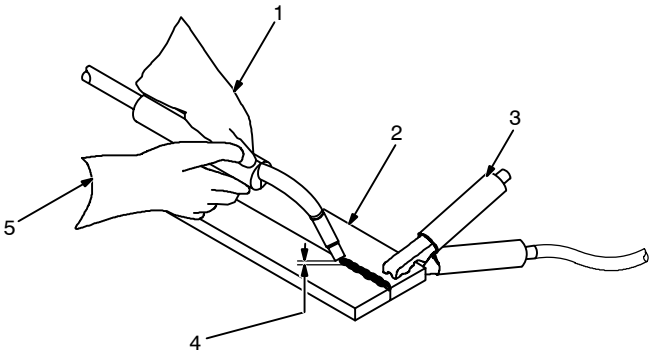


Ref. ST-801 865

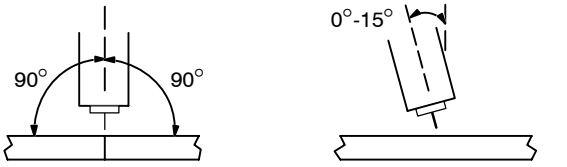
13-4. Holding And Positioning Welding Gun

NOTE ☞

Welding wire is energized when gun trigger is pressed. Before lowering helmet and pressing trigger, be sure wire is no more than 1/2 in (13 mm) past end of nozzle, and tip of wire is positioned correctly on seam.

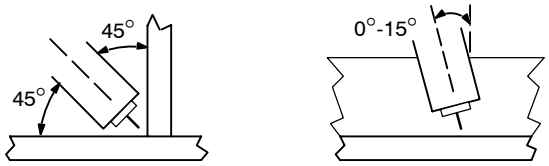


1 Hold Gun and Control Gun Trigger
2 Workpiece
3 Work Clamp
4 Electrode Extension (Stickout) 1/4 to 1/2 in (6 To 13 mm)
5 Cradle Gun and Rest Hand on Workpiece



End View Of Work Angle — Side View Of Gun Angle

GROOVE WELDS



End View Of Work Angle — Side View Of Gun Angle

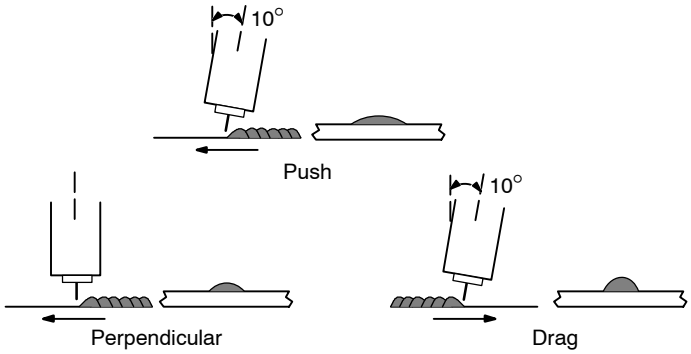
FILLET WELDS

S-0421-A

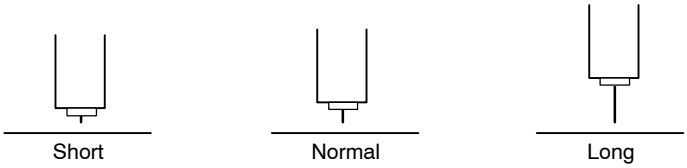
13-5. Conditions That Affect Weld Bead Shape

NOTE ☞

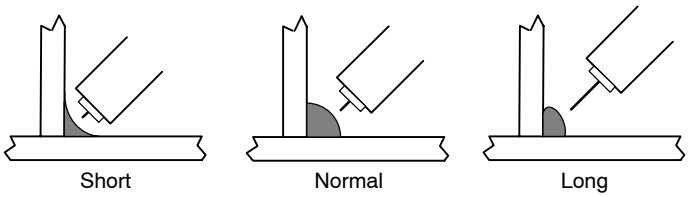
Weld bead shape depends on gun angle, direction of travel, electrode extension (stickout), travel speed, thickness of base metal, wire feed speed (weld current), and voltage.



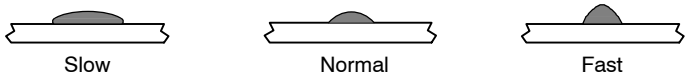
GUN ANGLES AND WELD BEAD PROFILES



ELECTRODE EXTENSIONS (STICKOUT)



FILLET WELD ELECTRODE EXTENSIONS (STICKOUT)

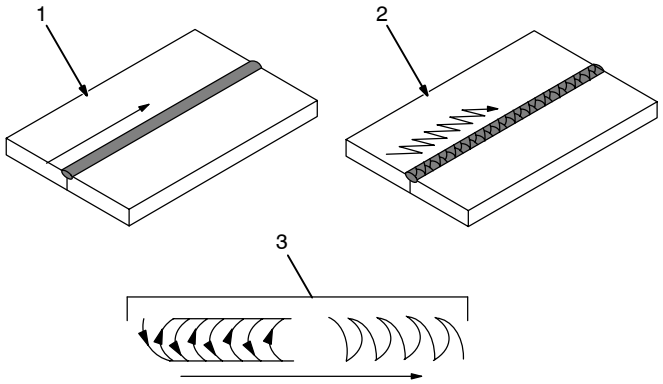


GUN TRAVEL SPEED

S-0634

13-6. Gun Movement During Welding

NOTE ☞ *Normally, a single stringer bead is satisfactory for most narrow groove weld joints; however, for wide groove weld joints or bridging across gaps, a weave bead or multiple stringer beads works better.*



1 Stringer Bead – Steady Movement Along Seam

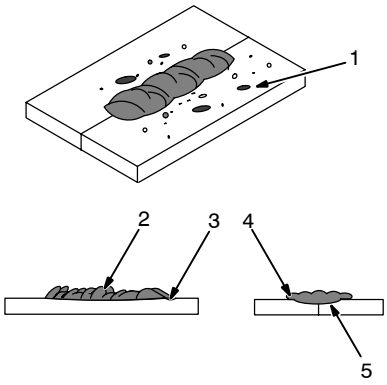
2 Weave Bead – Side To Side Movement Along Seam

3 Weave Patterns

Use weave patterns to cover a wide area in one pass of the electrode.

S-0054-A

13-7. Poor Weld Bead Characteristics



1 Large Spatter Deposits

2 Rough, Uneven Bead

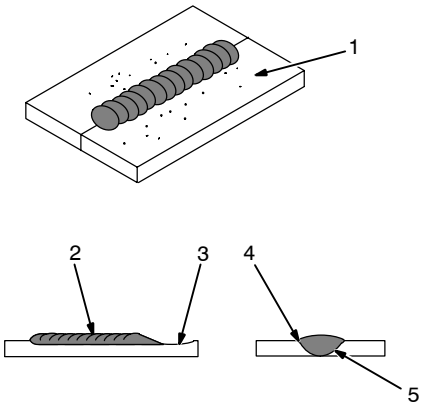
3 Slight Crater During Welding

4 Bad Overlap

5 Poor Penetration

S-0053-A

13-8. Good Weld Bead Characteristics



1 Fine Spatter

2 Uniform Bead

3 Moderate Crater During Welding

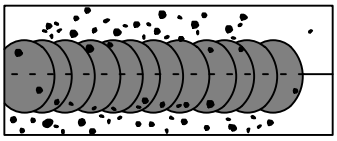
Weld a new bead or layer for each 1/8 in (3.2 mm) thickness in metals being welded.

4 No Overlap

5 Good Penetration into Base Metal

S-0052-B

13-9. Troubleshooting – Excessive Spatter

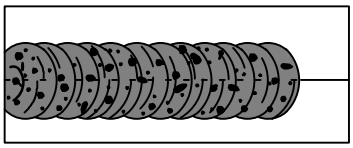


Excessive Spatter – scattering of molten metal particles that cool to solid form near weld bead.

S-0636

Possible Causes	Corrective Actions
Wire feed speed too high.	Select lower wire feed speed.
Voltage too high.	Select lower voltage range.
Electrode extension (stickout) too long.	Use shorter electrode extension (stickout).
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.
Insufficient shielding gas at welding arc.	Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.
Dirty welding wire.	Use clean, dry welding wire.
	Eliminate pickup of oil or lubricant on welding wire from feeder or liner.

13-10. Troubleshooting – Porosity

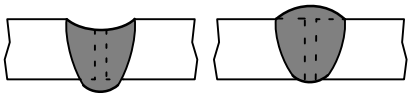


Porosity – small cavities or holes resulting from gas pockets in weld metal.

S-0635

Possible Causes	Corrective Actions
Insufficient shielding gas at welding arc.	Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.
	Remove spatter from gun nozzle.
	Check gas hoses for leaks.
	Place nozzle 1/4 to 1/2 in (6-13 mm) from workpiece.
	Hold gun near bead at end of weld until molten metal solidifies.
Wrong gas.	Use welding grade shielding gas; change to different gas.
Dirty welding wire.	Use clean, dry welding wire.
	Eliminate pick up of oil or lubricant on welding wire from feeder or liner.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, and dirt from work surface before welding.
	Use a more highly deoxidizing welding wire (contact supplier).
Welding wire extends too far out of nozzle.	Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.

13-11. Troubleshooting – Excessive Penetration



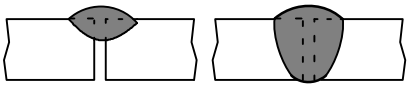
Excessive Penetration Good Penetration

Excessive Penetration – weld metal melting through base metal and hanging underneath weld.

S-0639

Possible Causes	Corrective Actions
Excessive heat input.	Select lower voltage range and reduce wire feed speed.
	Increase travel speed.

13-12. Troubleshooting – Lack Of Penetration

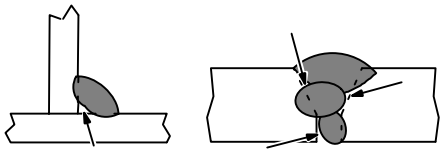


Lack Of Penetration – shallow fusion between weld metal and base metal.

S-0638

Possible Causes	Corrective Actions
Improper joint preparation.	Material too thick. Joint preparation and design must provide access to bottom of groove while maintaining proper welding wire extension and arc characteristics.
Improper weld technique.	Maintain normal gun angle of 0 to 15 degrees to achieve maximum penetration.
	Keep arc on leading edge of weld puddle.
	Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.
Insufficient heat input.	Select higher wire feed speed and/or select higher voltage range.
	Reduce travel speed.

13-13. Troubleshooting – Incomplete Fusion

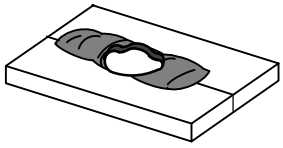


Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceeding weld bead.

S-0637

Possible Causes	Corrective Actions
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.
Insufficient heat input.	Select higher voltage range and/or adjust wire feed speed.
Improper welding technique.	Place stringer bead in proper location(s) at joint during welding.
	Adjust work angle or widen groove to access bottom during welding.
	Momentarily hold arc on groove side walls when using weaving technique.
	Keep arc on leading edge of weld puddle.
	Use correct gun angle of 0 to 15 degrees.

13-14. Troubleshooting – Burn-Through

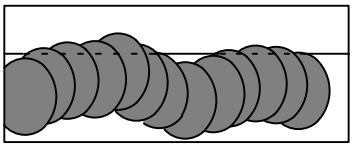


Burn-Through – weld metal melting completely through base metal resulting in holes where no metal remains.

S-0640

Possible Causes	Corrective Actions
Excessive heat input.	Select lower voltage range and reduce wire feed speed.
	Increase and/or maintain steady travel speed.

13-15. Troubleshooting – Waviness Of Bead

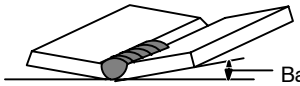


Waviness Of Bead – weld metal that is not parallel and does not cover joint formed by base metal.

S-0641

Possible Causes	Corrective Actions
Welding wire extends too far out of nozzle.	Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.
Unsteady hand.	Support hand on solid surface or use two hands.

13-16. Troubleshooting – Distortion



Distortion – contraction of weld metal during welding that forces base metal to move.

S-0642

Possible Causes	Corrective Actions
Excessive heat input.	Use restraint (clamp) to hold base metal in position.
	Make tack welds along joint before starting welding operation.
	Select lower voltage range and/or reduce wire feed speed.
	Increase travel speed.
	Weld in small segments and allow cooling between welds.

13-17. Common MIG Shielding Gases

This is a general chart for common gases and where they are used. Many different combinations (mixtures) of shielding gases have been developed over the years. The most commonly used shielding gases are listed in the following table.

Gas	Application					
	Spray Arc Steel	**Short Circuiting Steel**	**Spray Arc Stainless Steel**	**Short Circuiting Stainless Steel**	**Spray Arc Aluminum**	**Short Circuiting Aluminum**
Argon					All Positions[5]	All Positions
Argon + 1% O_2	Flat & Horizontal[5] Fillet		Flat & Horizontal[5] Fillet			
Argon + 2% O_2	Flat & Horizontal[5] Fillet		Flat & Horizontal[5] Fillet			
Argon + 5% O_2	Flat & Horizontal[5] Fillet					
Argon + 8% CO_2	Flat & Horizontal[5] Fillet	All Positions				
Argon + 25% CO_2	Flat & Horizontal[1] Fillet	All Positions		All Positions[3]		
Argon + 50% CO_2		All Positions				
CO_2	Flat & Horizontal[1] Fillet	All Positions				
Helium					All Positions[2]	
Argon + Helium					All Positions[2]	
Tri-Mix[4]				All Positions		

1 Globular Transfer

2 Heavy Thicknesses

3 Single Pass Welding Only

4 90% HE + 7-1/2% AR + 2-1/2% CO_2

5 Also for GMAW-P, All Positions

☞ *Hardware is common and not available unless listed.*

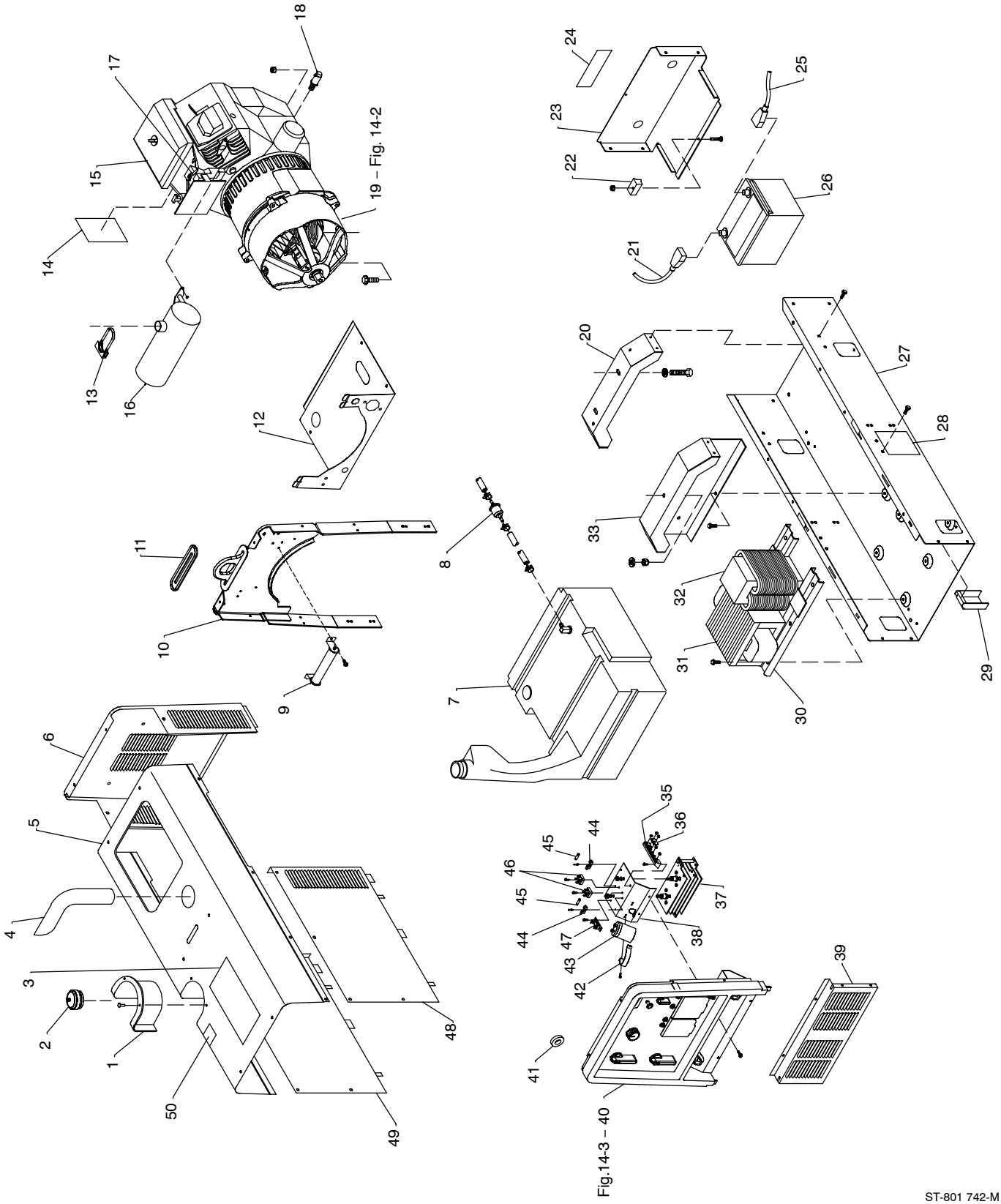


Figure 14-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 14-1. Main Assembly

1		181 881	GROMMET, neck filler	1
2		166 608	CAP, tank screw-on w/vent	1
3		200 795	LABEL, label,warning gen. precautionary csa	1
4		211 527	PIPE, exhaust elbow	1
4		205 609	PIPE, exhaust elbow (stainless)	1
5		+205 762	COVER, top	1
6		182 365	PANEL, rear upper	1
7		201 278	TANK, fuel 10gal	1
		187 502	FITTING, stand pipe hose	1
		124 253	BUSHING, fuel tank	1
		182 922	BUSHING, fuel tank 1.210 ID	1
		182 925	GAUGE, fuel	1
		213 851	KIT, service fuel gauge/bushing	1
8		215 985	FILTER KIT, fuel w/clamps	1
9	R2	200 518	RESISTOR, WW fxd 225W 3.15 ohm w/2.85 Ta	1
10		205 736	UPRIGHT, base	1
11		205 734	SEAL, weather lift eye	1
12		186 667	PANEL, rear lower	1
13		209 057	CLAMP, muffler 1.625 Dia. U-Pld	1
14		215 939	LABEL, engine maintenance	1
15		+198 552	ENGINE, gas elec start (Kohler)	1
16		183 435	MUFFLER	1
		189 477	MUFFLER GASKET	2
		165 271	VALVE, oil drain 3/8-18NPFT	1
17	TS1	199 530	SOLENOID, idle	1
			BRACKET, mtg solenoid (see engine parts list)	1
	F6	*021 718	FUSE, mintr gl 30A, 32V	1
	S5	162953	SWITCH, oil pressure kit	1
	D8	070 250	DIODE, Rect 3. A 600v Axial Lead *None Reel	1
18		165 271	VALVE, oil drain 3/8-18NPTF (included w/engine)	1
		180 096	TUNE UP & FILTER KIT, (Kohler)	1
		066 698	OIL FILTER	1
		215 985	FILTER/CLAMPS, fuel	1
		067 272	ELEMENT, air cleaner	1
		067 273	AIR FILTER, wrapper	1
		067 007	SPARK PLUG	2
		147 551	TOOL, puller rotor	1
		177 126	TOOL, puller rotor (adapter used w/ tool 147 551 on Kohler engines)	1
19	Figure 14-2		GENERATOR	1
20		173 043	BRACKET, mtg engine	1
21		217 848	CABLE, bat neg 15.000 No 4 AWG w/clamp & .343 rng	1
		172 669	CABLE, cable, bat neg 11.000 (engine block to case)	1
22		182 935	HOLD DOWN, battery	1
23		+201 174	DOOR, access battery	1
24		168 385	LABEL, warning battery	1
25		219 811	CABLE, bat pos 25.000 No 4 AWG w/clamp & .312 rng	1
26		168 037	BATTERY, stor 12V 415crk 95rsv GP58 dry	1
27		201 280	PAN, base	1
28		197 930	LABEL, warning do not weld on base	2
29		181 057	COVER, base	2
30		183 771	STAB/REACTOR ASSEMBLY	1
31	AC-Z	176 301	REACTOR	1
32	DC-Z	183 179	STABILIZER	1
		164 920	BRACKET, mtg stab/reactor	2
33		182 928	BRACKET, mtg generator	1
34		Deleted		
35	1T	172 661	BLOCK, term 20A 8P	1
36		173 734	LINK, jumper	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 14-1. Main Assembly (Continued)

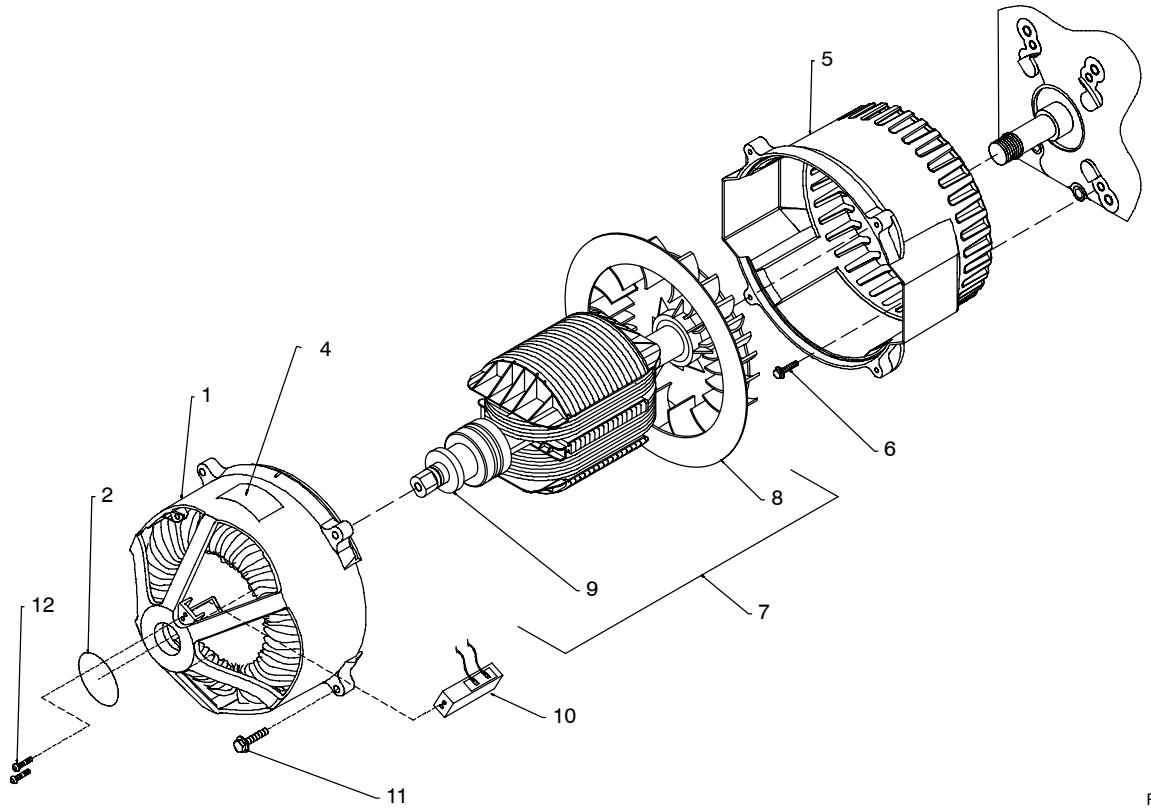
37	SR1	192 682	RECTIFIER, si 1 ph 240A 400PIV	1
38		172 625	BRACKET, mtg rec/comp	1
39		180 628	PANEL, front lower	1
40	Figure 14-3		PANEL, front w/components	1
41	CT1	201 784	TRANSFORMER, current sensing	1
42		177 136	CLAMP, capacitor 1.375dia clip	1
43	C1	210 639	CAPACITOR, elctlt 1500 uf 75 vdc can 1.40 dia	1
44		172 731	HOLDER, fuse mintr	2
45	F1, F2	*169 296	FUSE, mintr gl 25A 125V	2
46	SR2, SR3	035 704	RECTIFIER, integ bridge 40A 800V	2
47	D4	135 184	DIODE BOARD	1
48		182 367	PANEL, side RH	1
	RC4	116 045	CONNECTOR & PINS	1
49		182 366	PANEL, side LH	1
50		192 042	LABEL, warning engine fuel	1
		207 501	LABEL KIT, Kohler	1
		167 640	CONNECTOR, pins/soc	1
	RC6	168 844	CONNECTOR, rect	1
	RC7		CONNECTOR, part of TS1 (see engine parts list)	1
	PLG5	116 045	CONNECTOR & PINS	1
	PLG6	136 810	CONNECTOR & PINS	1
	PLG7		CONNECTOR, (see engine parts list)	1
	RC5		CONNECTOR, (see engine parts list)	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered. Order labels individually or as part of label kit 207504.

♦Optional

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.



Ref. 183 480-D

Figure 14-2. Generator

Item No.	Part No.	Description	Quantity

Figure 14-2. Generator (Figure 14-1 Item 19)

1	+216 625	GENERATOR ASSEMBLY, front (consisting of)	1
2	183 419	O−RING, 1.984 Id X .139 Cs 70 Duro Viton	1
3	Deleted		
4	013 367	LABEL, Warning Moving Parts Can Cause Serious Etc	1
5	185 148	HOUSING, Generator Rear	1
6	186 083	SCREW, 437−14x1.75 Hexwhd.93d Gr8 Pld	4
7	203 195	ROTOR, Generator (consisting of)	1
8	181 134	FAN, Rotor Gen	1
9	181 143	BEARING, Ball Rdl Sgl Row .984 X 2.047 X .59	1
10	205 725	BRUSHHOLDER ASSY, Generator	1
11	142 156	SCREW, 375−16x1.75 Hexwhd.81d Gr8 Pld	4
12	136 343	SCREW, K50x 20 Pan Hd−phl Stl Pld Pt Thread Forming	2

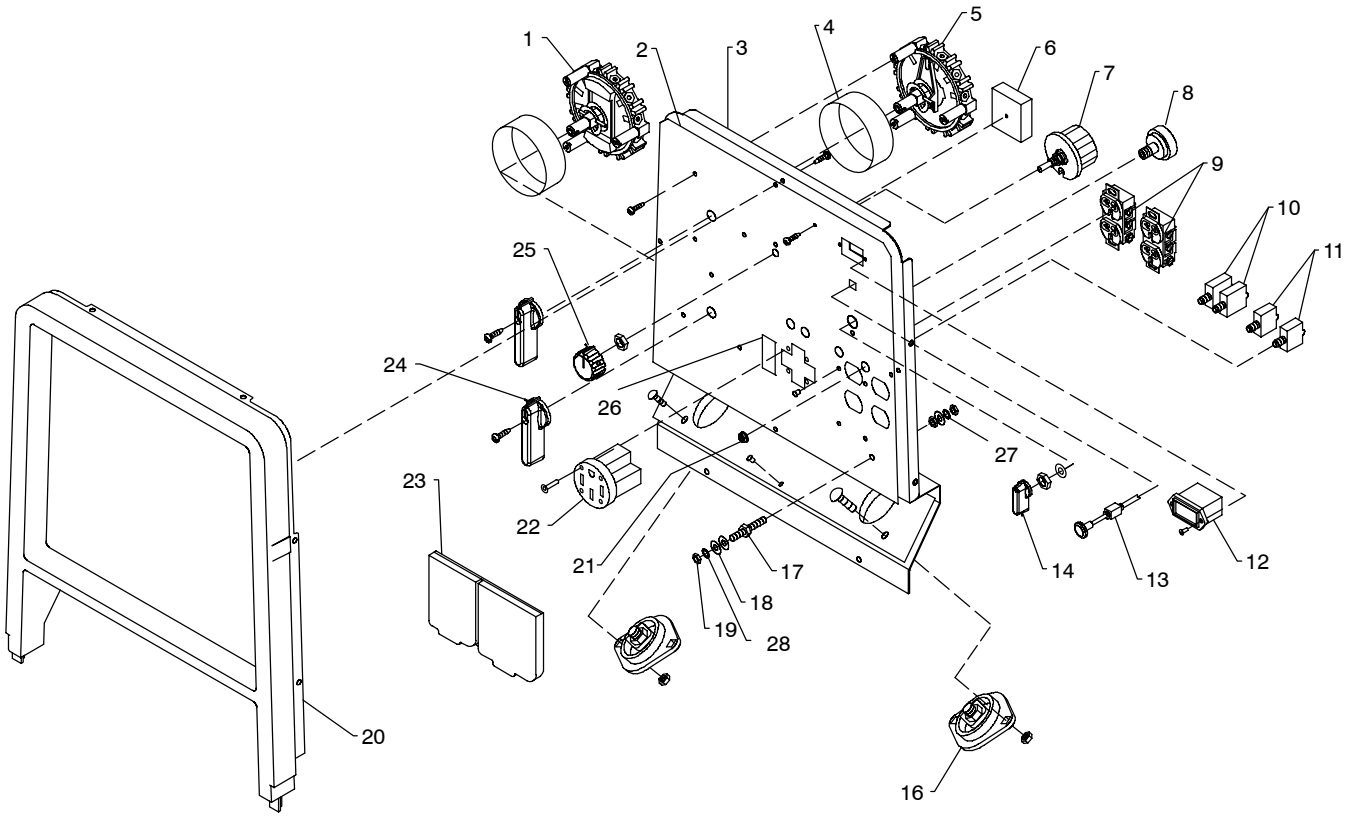


Figure 14-3. Panel, Front w/Components

ST-801 747-D

♦Optional

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 14-3. Panel, Front w/Components (Figure 14-1 Item 40) (Continued)

1	S1	184 754	SWITCH, polarity	1
2			NAMEPLATE (order by model and serial number)	1
3		207 845	PANEL, front	1
3		♦207 846	PANEL, front (w/GFCI/CSA receptacle option)	1
4		186 058	COVER, dust	2
5	S3	183 148	SWITCH, selector	1
6	PC1	201 936	MODULE, pull to idle 5 pin	1
7	R1	207 177	RHEOSTAT, WW 150W 14 ohm	1
8	S2	207 110	SWITCH, ignition 4 position w/out handle	1
9	RC2,3	141 432	RECEPTACLE, str dx grd 2P3W 20A 125VAC	2
9	GFCI 2,3	♦151 981	RECEPTACLE, str dx grd 2P3W 15/20A 125VAC GFCI	2
10	CB1,2	195 955	CIRCUIT BREAKER, 1P 50A 125VAC	2
10	CB1	♦♠218 591	CIRCUIT BREAKER, man reset 2p 50a 240vac screw−90 (CSA)	1
		♦202 631	COVER, circuit breaker (CSA)	1
		♦202 630	BRKT, mtg ckt breaker cover (CSA)	1
11	CB3,4	093 996	CIRCUIT BREAKER, 1P 20A 250VAC	2
11	CB3,4	♦093 995	CIRCUIT BREAKER, 1P 15A 250VAC	2
12	HM	145 247	METER, hour	1
13		203 993	CONTROL, push/pull snap−in 36.000 w/1.750 extension	1
14		207 073	LEVER, switch	1
15		Deleted		
16	Work, Elect	099 255	TERMINAL, pwr output	2
17		083 030	STUD, brs .250-20 x 1.750	1
18		010 915	WASHER, flat .250 ID brs	3
19		601 836	NUT, .250-20 brs	3
20		159 921	BEZEL	1
21		147 195	NUT, .375-27 nyl	4
22	RC1	182 954	RECEPTACLE, str 3P4W 50A 125/250VAC	1
		119 172	PLUG, str 50A 125/250V	
23		♦188 039	COVER, receptacle	1
24		207 074	HANDLE, switch	2
		136 343	SCREW, K50x 20 Pan Hd−phl Stl Pld Thread Forming (For Switch)	2
25		207 077	KNOB, pointer 1.625 dia. push on	1
26		200 532	LABEL, warning CSA circuit breaker	1
27		602 207	WASHER, lock .255idx0.489odx.062t stl pld split.250	1
28		163 167	WASHER, lock .254idx0.489odx.062t sst split.250	1

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(Equipment with a serial number preface of "LE" or newer)

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Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

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1. 5 Years Parts — 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies (Unless Otherwise Stated)
   * Intellitig
   * Maxstar 150
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor Unless Specified
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * Flowgauge and Flowmeter Regulators (No Labor)
   * HF Units
   * Grids
   * Maxstar 85, 140
   * Spot Welders
   * Load Banks
   * Arc Stud Power Sources & Arc Stud Guns
   * Racks
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT & SAF Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * Canvas Covers

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1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

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Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
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Miller Electric Mfg. Co.
An Illinois Tool Works Company
1635 West Spencer Street
Appleton, WI 54914 USA

International Headquarters–USA
USA Phone: 920-735-4505 Auto-Attended
USA & Canada FAX: 920-735-4134
International FAX: 920-735-4125

European Headquarters – United Kingdom
Phone: 44 (0) 1204-593493
FAX: 44 (0) 1204-598066

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